

CITY OF WORCESTER



OPEN SPACE & RECREATION PLAN **March, 2000**

SECTION I - EXECUTIVE SUMMARY

For more than a century, Worcester has been a provider of recreational facilities and services for its residents and the region. It has achieved a significant degree of success in that area as evidenced by several national and statewide awards for excellence in Parks and Recreation management. The parks in Worcester are well distributed and contain a variety of recreational facilities. Overall, the parks and other physical facilities are adequately maintained. Every year some facilities are either rehabilitated or receive new capital improvements. The Parks and Recreation Department is responsible for providing recreational services, including sports supervision, instruction, special events and managing physical facilities. The Department also operates programs in conjunction with many other departments and agencies to make Worcester a city of ample recreational opportunities for all of its residents.

In the following sections, Worcester's Parks and Open Space Plan, as well as a Five-Year Action Plan is presented. The Plan is organized into eleven sections with appendices as outlined in EOE Division of Conservation Services Open Space and Recreation Plan Requirements (1990) as follows:

- 1.0 Executive Summary**
- 2.0 Introduction**
- 3.0 Community Setting**
- 4.0 Inventory and Analysis**
- 5.0 Conservation and Recreation Lands**
- 6.0 Community Goals**
- 7.0 Analysis of Needs**
- 8.0 Goals and Objectives**
- 9.0 Five-Year Action Plan**
- 10.0 Public Comments**
- 11.0 References**

Worcester entered the 1990's with the primary goal of strengthening its role as the **regional hub of Central Massachusetts**. Several economic development projects recently completed or currently being planned for Worcester reinforce this goal, such as a new Airport Terminal, new Union Station Intermodal Transportation Center with a Commuter Rail Service to and from Boston, a new Convention Center, a new exit from the Massachusetts Turnpike with access directly into downtown Worcester by an upgraded Route 146 which runs south into Providence, Rhode Island, Medical City, the revitalization of the downtown mall into a fashion outlet mall and the Biotechnology Park. These projects will mean change for the City through job creation, additional visitors and development pressures.

No urban area can expect to prosper in the long run unless economic growth is coupled with an ongoing effort to protect, preserve, and enhance the natural environment and the recreational facilities which make it a unique and desirable place in which to live and to work. It is the goal of this plan to establish a framework of specific goals and objectives for open space and recreation which complement the City's progress in economic development.

The following Open Space and Recreation goals for Worcester reinforce the City's overall or primary goal:

- 1. *Acquire and improve passive and active recreation facilities and open space to support the well being of citizens and workers.***
- 2. *Serve as a regional center within Central Massachusetts for sports recreational activities.***
- 3. *Protect Worcester's natural and cultural resources which give it an identity of its own.***
- 4. *Create, protect and preserve greenway linkages, trail corridors, and bikeways connecting recreational, open space, and community resources in and around Worcester.***
- 5. *Educate the community about the importance of our natural, historical and recreational resources and the need to protect and respect them.***
- 6. *Encourage stricter enforcement and regular review of land development regulations that are already in effect.***
- 7. *Strive for more performance-based development regulations which include encouragement of land conservation and donations of open space.***
- 8. *Target acquisition and development of pocket parks to enhance neighborhood identity and community-sponsored green spaces.***

Five-Year Action Program Highlights

Since the completion of the 1994 Open Space and Recreation Plan, the City of Worcester has made significant progress obtaining open space and improving the City's Park facilities. The following is a list of completed projects, or projects that are currently under construction, that were included as targeted projects in the 1994 Five Year Program. These projects have furthered the City's goal of increasing the quality of life for its residents.

Park Improvements Since 1994:

Beaver Brook – building, courts and parking

Cristoforo Colombo – walkway and bandstand

Lake Park - Master Plan Implementation is 50% complete

Crompton Park - Multi-purpose field

Vernon Hill – renovation and replacement of existing play area to include courts multi-purpose fields

South Worcester – basketball court and parking

Green Hill Park – Master Plan Implementation 35%

Elm Park – Phase II Olmstead Program path system and pond

Greenwood Park – Play area, improvements to existing ballfield fencing, site amenities and walking path
Blithewood Playground –
Kendrick Softball Field – field rehabilitation
Duffy Field – play area
Banis Street Tot Lot – the installation of play equipment, swing set, walkways, site amenities and plantings

Completed Park Facility Master Planning Since 1994

Hadwen Park
Holmes Field
Apricot Street Playground
Logan Park
Great Brook Valley Playground
Proposed Coes Knife Park and Trail Center

Completed Conservation Parcel Master Planning Since 1994

Patches Reservoir (Tatnuck Brook Watershed Management Plan)
Dawson Road – Forest Stewardship Plan

Acquired Open Space Parcels Since 1994

Cascades West – 36 acres
Cascades East – 30.86 acres
Castle Street Garden -
Cider Mill Park -
Crow Hill (partial acquisition) – 27.9 acres
Crow Hill (pending) – 14.2 acres
Dawson Road – 37 acres
Middle River Park (Riley Stoker Property) – 23 acres

Acquired Parks

LakeView Playground

Conservation Restrictions Approved Since 1994:

Coal Mine Brook (Lakeside Trust Conservation Restriction) - 7.3 Acres
Ryan Conservation Restriction – 2 Acres
Wilson Conservation Restriction – 6 Acres
Cascades East – 31 Acres

Open Space Parcels Lost to Development Since 1994:

Joppa Way parcels
(near)Bancroft Tower
Sunderland Road Wasteland
Wildwood Laurel Brook

A great deal has been accomplished since the completion of the 1994 Open Space and Recreation Plan. The City of Worcester will continue to improve recreational opportunities as

well as preserve the valuable remaining open space throughout the City. The following is a list of targeted park facility improvements and open space acquisitions.

1. Targeted Park Facility Master Planning

Cookson Field

Dodge Park

Shale Street Playground

2. Targeted Conservation Parcel Master Planning

Broad Meadow Brook (in cooperation with MA Audubon)

3. Targeted Open Space Acquisition Parcels

Laurel Mountain (GWLTL acquisition pending)

Coes Reservoir

Coal Mine Brook

Broad Meadow Brook expansion

Perkins Farm Expansion?

Northwest Greenbelt Expansion

Kettle Brook North and South

Poor Farm Brook

Overlook Road Pond

Chiltern Hill Parcels

Stoddard Estate

Barber Ave. Swamp

Coal Mine Brook

Thayer Farm

Goddard Memorial West

Passway to Scandanavia

Coes Pond

Wildwood Ave./Kermit Road

James St./Laurier St.

Curtis Pond and Landfill

Ballard & Degman Estates

Blackstone Canal

Palace Garden Woodlot

Eskow Woodlot

Ernest Ave. Marsh

Columbus Park Extension

Logan Field Extension

Manhattan Road Extension

Mill Street Parcel

South Flagg Street Parcel

Mountain Street East Parcel

Massachusetts Highway Dept. Parcel

Moreland Street Parcel

Woodhaven Lane Parcel

Indian Lake Abutters

Catholic Charities (Parcel K)

Guerney Property

McCabe Property

Peters East

Quist Property

4. Targeted Parks Improvements

University Park - community building

City Common - Master Plan implementation

Bennett Field - Gates Lane School project

Salisbury Park - Bancroft Tower

Morgan Park

Columbus Park

Burncoat Park

Fairmount Park - play equipment, courts

Harrington Field - play area, courts

Holland Rink

Goddard Memorial Park

Dodge Park – Master Plan Implementation

Banis Street - Tot Lot

Mulcahy Field – rehabilitate little league field

Shale Street Playground – Master Plan Implementation

Green Hill Park – Soccer Field Improvements

Tacoma St. Playground – Replace Equipment and Improvements

Controls Basketball Courts

Newbury Street – Open Space

Roberto Clemente (Great Brook Valley)-
soccer, football and softball field

Cookson Field - Master Plan Implementation
Dodge Park - Master plan Implementation

SECTION II - INTRODUCTION

A. Purpose of Plan

The intent of this Open Space and Recreation Plan is to assess Worcester's recreation and open space needs and resources, and to recommend a strategy which will help the City to take full advantage of its opportunities over the next five years. This plan was also prepared in accordance with the guidelines of the Federal UPARR and Land and Water Conservation Fund programs as well as the Massachusetts Self-Help program. These programs assist municipalities in acquisition and/or development of recreation and conservation areas and facilities.

B. Planning Process and Public Participation

The development of Worcester's 1994 Open Space and Recreation Plan marked the first time that recreation, conservation and open space interests came together to develop a comprehensive plan for the City. In the past these groups have developed separate plans which were merged to create the final document. These groups have again collaborated to complete the 2000 Plan revisions to meet the changing needs of the City and its residents.

This integrated process was accomplished by involving key representatives from various groups into an ad hoc Open Space Advisory Committee which guides the development of this plan. This committee includes representatives from the following: the City of Worcester Conservation Commission, Parks and Recreation Department, Regional Environmental Council, Greater Worcester Land Trust, Massachusetts Audubon Society, Lake Quinsigamond Watershed Association, and Coes/Patches Watershed Association,

The Open Space and Recreation Plan must be revised every five years in order to provide accurate information, meet the changing needs of Worcester residents and the state open space grant funding guidelines of the Massachusetts Division of Conservation Services (DCS). The revision of the five-year plan began with updating factual information such as acquired land and newly completed parks improvements. This revised document was then presented to representatives of organizations present in the ad-hoc open space committee for review and approval. This committee met monthly over a five month period to analyze the community's needs and set priorities. OPCD staff then summarized these concerns into a draft plan which was circulated to the committee for comments. Comments received were incorporated into a second draft plan which was then discussed before final endorsement by the City Council. The result is a plan which integrates the needs of "special interest" groups as well as city-wide concerns.

Open Space Plan Implementation

Throughout this document, reference is made to accomplishments, goals and objectives and new problems which have arisen since the adoption and subsequent implementation of the City's 1987 and 1994 Open Space Plans, The following narrative provides a summary of the City's notable open space and recreation accomplishments since 1994.

1. Regulatory Accomplishments of the 1990's

- ***Wetlands Protection Ordinance***

In September of 1990, the City of Worcester adopted the City of Worcester's Wetlands Protection Ordinance. The Ordinance incorporates more stringent criteria to the definition of "alter" in the Massachusetts Wetlands Protection Act, and the regulations in 310 CMR 10.00. For example, the use of soils may be used in the determination of a wetland boundary in a disturbed area, a thirty (30) foot buffer zone to permanent structures and a fifteen (15) foot buffer zone to any land disturbance near a resource area. Also, the Massachusetts Wetlands Protection Act's criteria for an isolated land subject to flooding was changed from 1/4 acre foot of at least six (6) inches, once per year, to 1/8 acre foot. Any work that is to take place within one hundred (100) feet of a storm drain, catch basin, or inlet which drains into a wetland, must be permitted by the Conservation Commission.

- ***Aquifer Protection Overlay Zone***

Adopted in April 1991 as Article XII of the City's Zoning Ordinance, the Groundwater Protection Overlay Zones (GP-2 and GP-3 as defined by the state's wellhead protection standards) are based on recharge areas delineated in 1983 by IEP, Inc. The zones are generally located to the north of Belmont Street, west of Lake Quinsigamond and south of Mountain Street in the northeast section of the City. Within the zones are numerous commercial and industrial developments, including some pre-existing non-conforming land uses that have characteristics such as underground storage tanks which potentially pose high risks to the groundwater resources in the area.

- ***Cluster Zoning***

Adopted in April 1991, Article VIII of the Worcester Zoning Ordinance provides for cluster subdivision developments as a means of more efficient and effective development in the City while protecting its sensitive natural environment and providing for preservation of open space in both natural and improved states. To date, only one developer has filed a successful proposal under these regulations.

- ***Site Plan Approval***

Also adopted in April 1991, Article V of the Worcester Zoning Ordinance provides for individual detailed review of development proposals which have an impact on the natural and built environments of the City and upon the nature and provision of public services and generally, upon the City's character. Thresholds have been established for residential, manufacturing, business and general uses. Additionally, developments with slopes of 15 percent or greater automatically fall under plan review by the Planning Board.

- ***Floodplain Overlay District***

Article VI of the Worcester Zoning Ordinance has been established with the purpose of protecting floodplains as well as public health and safety by regulating land uses which cause increases in erosion, siltation, turbidity, flood heights and flood velocities. Over fifteen specific purposes are stated in the Ordinance. This provision of the Ordinance allows the Code Commissioner to review permits; notify adjacent communities, the local Conservation Commission, and MADEM staff prior to alterations or relocations; and assure that maintenance is provided and that the flood carrying capacity of flood hazard areas and watercourses is not diminished through annual reporting to FEMA, engineering verification, and standard floodproofing techniques.

- ***Zoning Landscape Ordinance***

To decrease the amount of urban runoff and increase infiltration and the aesthetics of the City a zoning amendment was adopted in April of 1998 requiring perimeter and interior landscaping for all off street parking lots submitted for Planning Board parking plan approval.

2. Non-Regulatory Accomplishments

- ***Public-Private Partnerships***

- a. City and Massachusetts Audubon Society - Land assembly for Broad Meadow Brook Wildlife Sanctuary and environmental advocacy.
- b. City and Blackstone River Valley National Heritage Corridor Commission - Twenty-six community land use, natural and cultural resource planning.
- c. City and Greater Worcester Land Trust - Acquisition of targeted open space parcels, co-holders of conservation restrictions.
- d. City and the Regional Environmental Council - Annual Earth Day cleanup campaign to increase public awareness and stewardship of parks and open spaces.
- e. City and Greater Worcester Land Trust – Land assembly for Cider Mill Park off of Apricot Street and Goddard Memorial Drive.

- ***City Organizational Framework***

- a. Interdepartmental Water Resource Planning Committee.
- b. Water Resources Coordinator, Department of Public Works (Water Operations).
- c. Stormwater Coordinator, Department of Public Works (Engineering).
- d. Interdepartmental review of development applications.

Protected Open Space

1. Broad Meadow Brook Wildlife Sanctuary - 277 acres*
(Audubon Society management)
2. Perkins Farm Conservation Area - 80 acres (Conservation Commission)
3. God's Acre Conservation Area - 130 acres (Worcester Airport)
4. Carter Road Conservation Area - 15 acres (Conservation Commission)
5. Patches Pond Addition - 6 acres (Conservation Commission)
6. Cascades West – 37 acres (Greater Worcester Land Trust)**
7. Dallas Touraine Conservation Area - 12 acres (Conservation Commission)
8. Dawson Road Open Space Area - 37 acres (Conservation Commission)
9. Crow Hill Open Space Area – 27.9 acres (Greater Worcester Land Trust)
10. Crow Hill Open Space Area - 14.2 (Conservation Commission, sale pending)
11. Cider Mill Pond – 9 acres (Greater Worcester Land Trust) 24 acres (Parks Department)
12. Riley Stoker Middle River Parkway – 23 acres (Parks Department)
12. Lindberg Property (Brattle Street)– 36.22 acres (Greater Worcester Land Trust)
13. Brigham Road Parcels – 2.63 acres (Greater Worcester Land Trust)
14. Ryan Ornamental Conservation Restriction – 1.94 acres (Greater Worcester Land Trust)
15. Marois Property – 28.20 acres (Greater Worcester Land Trust)
16. Kettle Brook Property – 14.37 acres (Greater Worcester Land Trust)

17. Coal Mine Brook Conservation Restriction – 7.3 acres (Greater Worcester Foundation)
18. Cascades East – 31.86 acres (Conservation Commission GWLT Conservation Restriction)

(Key: * - some land held by conservation easement and management
agreement only
** - over 110 acres within the Town of Holden)

Recreation

19. Ty Cobb Fields - 11 acres (Parks Department)
20. Blithewood Playground - 3.5 acres (Parks Department)
21. Shore Park (DEM funding) - 5 acres (Parks Department)
22. DEM Canal Exhibit - 15 acres (DEM)
23. Lakeview Playground – 1.03 acres (Parks Department)

SECTION III - COMMUNITY SETTING

Regional Context

The City of Worcester is in the heart of Central Massachusetts and to a larger extent New England. Over one million people live within a 25 mile radius of the city, six million within 50 miles, more than eight million within 75 miles. Worcester is also the educational, medical and commercial hub of Central Massachusetts. There are ten colleges and universities within the City limits, several major hospitals, and as of 1991, a labor force of over 75,000.

Worcester is easily accessible to the rest of New England via the Interstate Highway Network and other major federal and state highways. I-190 and I-290 intersect within the City of Worcester. Route 146 connects Worcester to Providence, Rhode Island. I-90 (Massachusetts Turnpike), I-395 and I-495 are only minutes away from downtown Worcester. Additionally, the City is well served by rail links in all directions, including the intermodal container terminal at the “Port of Worcester”.

Worcester's location provides ready access to natural resources such as the Atlantic Coast and Cape Cod to the south and east, the Berkshires to the west and the Green and White Mountains to the north. Worcester itself consists of several hills and striking topography with numerous wetlands, lakes, ponds and waterways. Much of Worcester's development during the late 19th and early 20th century's was linked to its abundant water resources. Although Worcester is considered urban and has a highly developed downtown and traditional residential areas, many of the city's outlying areas have suburban qualities, with residential subdivisions and strip commercial developments.

History of the Community

Worcester is a city formed by its geography. Its manufacturing heritage used the City's water resources as part of the production process. Plants located in valleys and workers found housing in the hills around the plants. The multitude of hills made it possible for various ethnic groups to find housing in contiguous and readily definable neighborhoods. Roadways and public transportation were structured in ways which accommodated Worcester's dramatic topography. A few distinct roads crossed or skirted Worcester's hills, connecting its several residential areas to the places where people went to work or shop. Open spaces, including parks and playgrounds, were integrated into the fabric of Worcester's neighborhoods, as were schools. (Worcester Master Plan, 1987)

Established as a town in 1722, Worcester's growth can be traced closely to the growth of industrial America. Inexpensive power and transportation via the Blackstone Canal (1827-1848), reinforced an industrial boom that began with industrial textile production in the 1790's. However, the Canal was soon replaced by the railroad as the transportation mode of choice. Once a rural agricultural community that became the county seat, Worcester evolved into a major manufacturing center for small industries as well as large nationally important producers of machinery, hardware and wire.

The development of the built environment and the preservation of open spaces and parks are reflective of this economic and social history.

The streams, ponds and canals that aided Worcester's early growth became a disposal system for the industries they once fueled. By the mid to late 19th Century, these water resources had become an environmental nuisance and were either filled in or covered. Worcester became the only major city in New England, and one of the few in the American East, which does not have a visible river system in its downtown, the major water power resources are on the fringes of downtown.

While the City may have historically neglected the importance of protecting environmental resources such as its water, it does have a long history of providing parks and open space to its residents. In June of 1669, Worcester established its first open space. The Worcester Common was a 20 acre parcel established to serve as a common open space for the citizens. Although only 4.4 acres remain, the Common continues to provide vital open space in the downtown area.

Worcester's most historic park is Elm Park. The City acquired the land for Elm Park in 1854, thus making Worcester one of the first cities in the United States to use public funds to purchase land for a public park. Both the Worcester Common and Elm Park are on the National Register of Historic Places. Other Worcester park landmarks on the Register include Green Hill Park Refectory (1911) and Bancroft Tower (built in 1900 in Salisbury Park).

Worcester formed its first Parks Commission in 1863. At the time the Commission's emphasis centered on City trees. Their mission soon expanded to adding parks to the City's system. The Commission established a comprehensive plan for parks in 1885, that addressed their location, function and use. Worcester hired its first full-time parks superintendent in 1896, as the City acquired more parks. The formal concept for the park system at that time was to connect the City's parks with avenues and boulevards. The Park System began to focus on recreation issues and preserving important open space in its natural condition rather than horticultural issues. The City also established a playground budget to acquire and improve playgrounds.

By 1910, Worcester's Park System contained approximately 1,000 acres. Since then, Worcester has added over 200 acres to the system. Recently the City's Parks and Recreation Department has worked with the Office of Planning and Community Development to revitalize the City's parks and playgrounds through the City's Community Development Program, state and federal grants as well as other resources.

Population Characteristics

The population of Worcester peaked at a level of about 210,000 in 1950. Thereafter the population steadily declined to a low in 1980 of 161,799. During the 1980's, the population rebounded. In 1990 Worcester had a population of 169,759 persons and the population has decreased to 166,219 in 1998.

During the 1990's several trends emerged which impacted the need for public open spaces:

- *The number of children are increasing:* The 1995 census report produced by the MISER State Data Center showed that the population for children between ages five to fourteen have increased significantly. From 1990 to 1995 the number of children ages five to nine increased from 10,530 to 11,490, a gain of nine percent. From 1990 to 1995 the population of children age ten to fourteen increased from 9,184 to 9,732, a gain of six percent.
- *Surprising growth in “inner-city” neighborhoods as well as the city’s margins:* In the last ten years, several of the inner-city neighborhoods experienced significant population increases. In contrast, during the previous ten years, these neighborhoods, which include the Downtown, Beacon/Brightly, Piedmont and Pleasant St./Elm Park, generally declined in population. Marginal areas of the City which have been subjected to intense residential subdivision have also grown significantly.
- *The Downtown had the highest population growth of all the census tracts throughout the city:* Between 1990 and 1998 the downtown population increased by 33.6%. This population increase reinforces the goal of the City’s downtown planning efforts to increase the residential population. Many buildings throughout the downtown area have been converted into residential units. One of the largest projects accounting for this population increase was the conversion of the Clarion Hotel Suites into condominium units in the early 1990’s.

Table 3.1 Major Population Shifts

<i>Neighborhood Population Changes</i>					
Neighborhood	(Census Bloc)	Population		Estimated	Population Change
		1980	1990	Population 1998	
Downtown	7317	1843	2300	3073	33.6%
Shrewsbury St./U. Mass	7321	690	602	706	17.3%
Sunderland/Massasoit	7328	5558	7128	7866	10.4%
Main South	7312.02	1069	1367	1460	6.8%
Airport/Hadwen Park	7310	5986	7293	7425	1.8%
Tatnuck	7309.02	3297	2829	2858	1.0%
Salisbury	7308.02	2538	2139	2160	1.0%
Hadwen	7331.02	2247	2122	2084	-1.8%
Park/Jamesville					
Indian Hill	7306	6612	7962	7399	-7.1%
Brittan Sq./Lincoln	7304.02	2028	1731	1563	-9.7%
Main South	7313	3314	4081	3472	-14.9%

Growth and Development Patterns

1. Patterns and Trends

During the last cycle of intensive community development in the 1990’s, Worcester’s rate and pattern of residential development generally consisted of development in outlying areas rather than

in-fill development within existing neighborhoods. In the past decade the City's Planning Board has approved over six hundred units of residential development which consist of both multi- and single-family development in varying size subdivisions. Many developments are active and are being built in phases to reduce the impact placed on the City's infrastructure, school system and the environment. As a result of the strong economy, since 1997 several preliminary subdivision plans have been submitted to the Planning Board which poses a greater threat to the already limited amount of remaining open space in the City of Worcester.

Commercial and industrial development has generally followed this pattern as well. Biotechnology has emerged as an economic development theme in the eastern portion of the City along Plantation and Belmont Streets and a commercial mall has developed in the north central portion of the City, adjacent to the interstates. Multiple downtown projects have been completed since 1994 or are in the final stages of construction: Worcester Medical Center, rehabilitation of Union Station into a regional intermodal transportation center, rehabilitation of the Worcester Center Galleria into a regional shopping center, and an addition of a convention center to the Centrum facility. Re-use of "brown" lands within the downtown area will have a positive impact on Worcester's environment in the future as many historically industrial-related problems as well as areas of urban blight will be resolved to modern environmental standards.

2. Infrastructure

- **Transportation System** - The City is centrally bisected by Interstates 190 and 290, which provide a regional transportation link throughout Central Massachusetts to Interstates 495 and 90 (Massachusetts Turnpike). Route 146 is currently being improved and expanded and will directly connect downtown Worcester to Providence, Rhode Island. The City is also bisected by Route 9, a highly developed commercial linkage from Worcester to Boston to the east and Amherst to the west. Two other major east-west routes (Routes 20 and 122) and three north-south highways (Routes 12, 70 and 122A) pass through Worcester. Locally, the City has over 2,000 streets listed in its Official Street directory (a list of public and private streets that are approved for building).

There is a general agreement that in order to satisfy the increased transportation demand associated with economic development, while at the same time complying with the statutory requirements of the Clean Air Act, the City must diversify its transportation system to make it more efficient. Such a diversification will include:

- Enhancement of the public transit system (bus, commuter rail, and Intermodal Transportation Center),
 - Promotion of ridesharing (through parking policies, park-and-ride lots, and a transportation management association), and
 - Promotion of walking and bicycling through urban design, streetscape improvements and trail creation.
- **Water Supply Systems** - There are ten local water reservoir sources serving the City of Worcester which have a safe yield of over 27 million gallons per day. In addition, the City has emergency connections to the MWRA system via the Wachusett Reservoir to the north. Worcester also has ten emergency and active interconnections with other public water supply systems. One hundred percent (100%) of the City's residents are served by the public water

supply system as are an additional 4,500 people outside of the City in the towns of Holden and Auburn. Water treatment presently includes disinfection only; other practices such as filtration, and corrosion control are planned for the future. Additionally, development of additional groundwater sources within the North Quinsigamond Aquifer is planned in order to meet projected average daily demand for the 21st century.

- Sewer Service - The City of Worcester is an active member of the Upper Blackstone Water Pollution Abatement District. Over 90% of the waste received at this regional wastewater treatment facility is from residents of the City of Worcester. The facility also processes industrial wastewater and has enacted an industrial pretreatment program.

3. Long-term Development Patterns

Since completion of the 1994 Open Space and Recreation Plan, Worcester continues to make great strides in environmental protection, historic preservation and economic development. A reversal of the Post World War II trends identified in the 1994 Plan continues in 2000 through a shifting focus to streetscaping, mass transit, open space protection, biotechnology, etc. The City has enacted a number of regulatory water supply protection measures including Water Resources Protection Overlay District, Floodplain Overlay District, Wetland Protection Ordinance and Regulations, Earth Removal Ordinance, as well as provisions for Planned Unit Developments, Site Plan Review, landscaping standards for new development, and approval for Special Permits. The City has also established priorities for future watershed and wellhead protection area land acquisitions.

In summary, implementation of the 1994 Open Space and Recreation Plan has included, but is not limited to the following:

- The protection of over seven-hundred (700) acres of conservation land, including the assembly of Cider Mill Park (33 acres), Cascades East (31.86 acres), and the Middle River Park consisting of land donated by Riley Stoker Company (29.55 acres)
- The inclusion of over 650 historic properties in the Massachusetts Register of Historic Places. In addition, a historical consultant was hired by the Office of Planning and Community Development, through a grant received by the Massachusetts Historical Commission, to update the state inventory MACRIS list and prepare forms for properties that are eligible to be placed on the National Register of Historic Places.
- Transportation corridor and greenway development along the Blackstone River involving the new Massachusetts Turnpike interchange and a linkage to downtown, new rail spurs, a bikeway and a Blackstone Canal Visitor's Center.
- Downtown development projects including an intermodal transportation center at Union Station, streetscaping, urban gateway programs, and convention center adjacent to the Centrum.

SECTION IV - INVENTORY AND ANALYSIS

A. Geology, Soils and Topography

A-1. Geology

Central Massachusetts was subjected to the rigorous physical alterations of the Wisconsin stage of Pleistocene glaciation. Local landforms are characteristic of glacial transport and deposition. The ice sheet advanced in a southerly direction, and eroded differentially in folded belts of rocks. Predominantly sedimentary in origin, the rocks in the area have been subjected to intense deformation by the pressures and temperatures accompanying igneous intrusion and erosion by fluvial and glacial activities. For the most part, the rocks are now metamorphic in nature. The common bedrock units in the area are:

- *Worcester Phyllite (Carboniferous sedimentary rock - Paleozoic Era)*
- *Oakdale Quartzite (Carboniferous sedimentary rock - Paleozoic Era)*
- *Paxton Quartz Schist (Carboniferous sedimentary rock - Paleozoic Era)*
- *Oxford Schist (Carboniferous sedimentary rock - Paleozoic Era)*
- *Ayer Granite (Late carboniferous igneous rock - Triassic Era)*

The phyllite and quartzite in the Worcester area typically underlie the lower, flat tracts of land. The granite is concentrated in prominent hilly areas of the City. Gneiss and schist occupy the higher lands east and west of the city proper. However, not all aspects of the landscape form can be correlated with rock types. The Quinsigamond Valley appears to follow some line of structural weakness in the underlying bedrock. Outwash lies high in the valley, with flood plain deposits following southward along the City's eastern border to an area of ground moraine and recessional moraine in the southeast corner of the City.

Glacial geology has left the central portion of the City overlain with outwash deposits and a large area of glacial moraine, surrounded to the northwest by numerous drumlins and recessional moraine and to the southwest by glacial moraine and a single esker.

A-2. Soils

Based on the findings of the U.S. Soil Conservation Service's Soil Survey (1985), Worcester is made up of the following main group of soils (see Map 6 in Appendix B):

- | | |
|-----|---|
| 41% | Urban land complex |
| 31% | Paxton, Woodbridge or Canton fine sandy loams, moderately well drained but stony. |
| 10% | Chatfield-Hollis rock outcrop complex |
| 18% | Well drained to excessively drained soils |

The **Paxton-Urban Land complex** consists of soils which are very deep, nearly level to moderately steep soils that are well drained on uplands. The dominant soils in the complex have slow to very slow permeability in the substratum and firm glacial till at a depth of about two feet. The dominant minor soils in this complex are somewhat poorly drained soils.

The **Paxton-Woodbridge-Canton** complex consists of very deep, nearly level to steep soils that are well drained and moderately well drained on uplands. The complex consists of upland hills and ridges dissected by many small drainage ways. The soils formed in glacial till. The permeability of the soils is slow to very slow in the substratum with the exception of the Canton soils which permeate rapidly. Slope, the seasonal high water table, a frost action potential and firm substratum are the major limitations for development.

The **Chatfield-Hollis complex** is characterized by moderately deep and shallow, gently sloping to moderately steep soils that are well-drained or somewhat excessively drained on uplands. The complex consists of hills and ridges with many bedrock exposures throughout. The soils formed in glacial till. Bedrock is at a depth of 20 to 40 inches. The permeability of the soils is moderate or moderately rapid.

The soils complexes noted above are only general classifications, their suitability for development is dependent on soil features and the specific type and scale of use being considered. Soil suitability for individual sewage disposal systems is generally not a determining factor as over 90% of the City is served by public sewers. Current regulated soil factors include but are not limited to restrictive features such as wetness, slope, and susceptibility to flooding.

A-3. Topography

Worcester is made up of the following topographic regions: Worcester Lowland; Central Upland of Massachusetts; East Side Hills; and Quinsigamond Valley.

The Worcester Lowlands occupies part of a basin in the center of the City. This basin is bordered by considerably higher ground on both the east and west sides. The flattest parts of this area lie at an elevation of about 500 feet above sea level.

The western border of the Worcester Lowlands is marked by an abrupt rise in elevation. This rise in land is the eastern boundary of the Central Upland of Massachusetts. The Central Uplands stretch west to the Connecticut River Valley. The elevations of these broad-summitted hills lie in the 1,000 foot range, rising above narrow lowlands with streams and ponds in the 700-800 foot range. The Worcester Airport rests on one of these hills at an elevation of about 1,000 feet.

At the opposite border of the Worcester Lowlands are the East Side Hills. The summits of these hills lie in the 700 foot range. These hills include the Burncoat Street area, Green Hill Park, the Oak Hill District, Union Hill and Packachoag Hill areas.

Traveling further east is the Quinsigamond Valley, the eastern border of the City. Lake Quinsigamond occupies the central part of this valley. The elevations along the lake's shores are the lowest in the City. The lake is one of three natural water bodies in the City, the others being Indian Lake and Bell Pond.

B. Landscape Character

Urban open space is present in a variety of forms -- parks and playgrounds for active recreation, tree-lined streets which provide shade and color, and undeveloped land in its natural state. To a great extent, Worcester's city form is a result of its natural environment. Topography, waterways and valleys helped shape the built form of the City. Valleys and waterways were locations for industry. The radial circulation pattern followed the hilly topography. Residential neighborhoods developed on the hills around workplaces. The multiple hills allowed an evolution of many neighborhoods, each with a clear identity, tradition, and relationship to the natural environment (Worcester Master Plan, 1987).

The following resources are examples of Worcester's unique landscape character:

Crow Hill Drumlin - This area was identified for acquisition in the 1987 Open Space Plan. In 1999, the Greater Worcester Land Trust acquired 27.9 acres of the 42 acre. The City of Worcester, OPCD is in the process of applying for funds through DEM to acquire the remaining 14.2 acres. The hill has fine white hardpan (clay) which was mined for a brick factory formerly located on the site. The exposed clay escarpment is a significant geologic formation and the summit provides a 360-degree panoramic view of the City.

Green Hill Park - This City-owned park represents a landscape which has been greatly transformed in the past several centuries, from wilderness to farmland, to a country estate and finally a unique multiple-use public park. Development of the land was carefully planned and managed by the Green family for over a century. The park offers unique vistas and panoramas to residents from the rolling Millstone, Crown, Green and Chandler Hills as well as areas of mature woodlands and open space.

God's Acre - Owned by the Worcester Airport Commission, this area is under a conservation restriction which prohibits further development in the area. God's Acre provides several walking paths through wooded swamp and wetland forest. Prominent vegetation in the upland areas include laurels, evergreens, red oaks, American chestnut, and stands of hickory and red maple trees.

Lake Quinsigamond - Located at Worcester's lowest elevation, the Lake consists of a deep northern basin of 475 acres and a shallow 297 acre southern basin known as Flint Pond. Lake Quinsigamond's primary outlet is through Irish Dam, forming the Quinsigamond River. The distinct physiognomy of the Lake's narrow, steep-sided northern portion is reminiscent of a Norwegian fjord. Because of this, the Lake deserves special recognition as a unique physiographic feature of the regional landscape.

Blackstone Valley - Approximately 99 percent of Worcester lies within the Blackstone River Basin, which is divided into several sub-basins. The River's headwaters flow throughout the City's wetlands and streams and portions of the City have been included in the congressionally-designated Blackstone River Valley National Heritage Corridor.

C. Water Resources

C-1. Surface Water

C-1(a) Rivers and Streams

Despite its urban character, Worcester boasts many watercourses of significance to the region (see Map 3 in Appendix B). The Blackstone River's headwaters flow from the north and western portions of the City through Beaver Brook and the Middle River and the waters of Lake Quinsigamond flow into the Blackstone River from the southeastern portion of the City through the Town of Grafton.

Blackstone River

"The hardest working river, the most thoroughly harnessed to the mill wheels of labor in the United States and probably the world, is the Blackstone."

- Winthrop Packard, 1909

The headwaters of the Blackstone River are located within the City limits. The tributaries to the headwaters include Mill Brook, Beaver Brook, Tatnuck Brook, and Middle River. The official headwaters are located at Beaver and Weasel Brooks. Much of the natural runoff feeding the northern section of the River has been cut off due to the installation of a public sewer system and other utilities. The River is subject to extensive urban runoff and wet weather overflows which are discussed further in the text.

Middle River

Formed at the confluence of Tatnuck Brook, Beaver Brook and Kettle Brook in the central western portion of the city known as Webster Square, the Middle River and its surrounding wetlands have a history of flooding and have been the subject of public works diversion and floodproofing projects.

Mill Brook Sewer and Flood Control Conduits

Another Blackstone River tributary, the Mill Brook, once an open canal (Blackstone Canal) and later a sewer system and flood control conduit, was walled and arched in the mid 1800's. There is a possibility that certain sections of the canal could be opened for historic purposes and for viewing of the unique granite structure of the canal. Problems of low water levels, open sewage, hazardous sediments, and other public health concerns would need to be addressed in a feasibility study as the conduit currently serves as a dry weather sanitary sewer and wet weather combined sewer overflow.

Coal Mine and Poor Farm Brooks

The Coal Mine and Poor Farm Brooks lie within the North Quinsigamond Aquifer Recharge Area and have been included within the City's Watershed Protection Overlay District in order to protect the critical recharge area for the City's Shrewsbury and Coal Mine Brook Wells. Although groundwater investigations for potential water supplies have been the focus in the area, the value of these surface water resources has been included within the targeted open space acquisitions section of this plan as well as plans for the expansion of Biotech Park.

C-1(b)Great Ponds

Great Ponds are defined and protected by the Massachusetts Wetlands Protection Act (MGL Ch. 91) and the Massachusetts Department of Environmental Protection's Waterways Program which controls activities on specific water ways for the purpose of the betterment of the waterway and the public good. Great Ponds are defined as any pond greater than ten (10) acres in its natural state calculated by the surface area of land under the natural high water mark. There are a number of great ponds located entirely or partially within the City of Worcester. Those listed by the Department of Environmental Protection are:

Coes Reservoir	Curtis Ponds	Flint Pond
Green Hill Pond	Leesville Pond	Patch Reservoir
Lake Quinsigamond	North Pond (Indian Lake)	
Salisbury Pond	Thayers Res. (Cook Pond)	

Recreational Usage

In addition to City-owned and maintained beaches and access to water bodies such as Coes Reservoir, Indian Lake, Bell Pond and Lake Quinsigamond, many other ponds are used for active and passive recreation throughout the City. Worcester's water bodies provide aesthetic as well as recreational value to the quality of life in the city. It is important to expand on the public access points on water bodies throughout the City so that a larger population can enjoy them.

Water Quality

The water quality of some of the City's watersheds has been adversely impacted by marginal residential development practices and intense commercial and industrial development. In addition to being called the hardest working river in the nation, the Blackstone became the victim of the industrial revolution through deposition of untreated sewage and industrial wastes in the 19th and 20th centuries. The passage and implementation of anti-pollution laws and the establishment of municipal wastewater treatment plants have improved the quality of the river and the City's other water bodies in recent years, but more must still be done.

For example, in the Tatnuck Brook Watershed, Patches Reservoir has been impacted by conversion of nearby seasonal homes without the installation of public sewers as well as stormwater runoff. Additionally upstream impacts to water quality from development and maintenance practices at the municipal airport have impacted the water body. The City's Health Department has begun a systematic sampling program for the pond to attempt to identify further sources of degradation. The City's Conservation Commission and Recreation Department jointly filed for Clean Lakes funding in cooperation with the Coes-Patches Watershed Association to implement watershed best management practices. In 1997 a Comprehensive Management Plan was completed for Patches Reservoir by GZA GeoEnvironmental, Inc through joint funding provided by the Department of Environmental Management's Lakes and Ponds Program and the City of Worcester. The water quality of the reservoir exhibited problems that are typical of urban water bodies, such as sedimentation deposition and eutrophication, but the overall quality of water is still in fair condition. This plan includes a variety of watershed and in-reservoir techniques to preserve and slowly increase the water quality of Patches Reservoir.

While most point sources of pollution have been systematically eliminated by sewer and ISDS upgrades, Lake Quinsigamond is also adversely impacted by poorly controlled non-point source runoff. The lakeshore is heavily developed by residential as well as commercial land uses which has led to a mesotrophic state in the lake and a eutrophic state in Flint Pond downstream. In 1999 the Office of Planning and Community Development received a grant through the Department of Environmental Management's Lakes and Ponds Program. Match funding was provided by a joint effort of various organizations including: OPCD, the Lake Quinsigamond Commission (through the Greater Worcester Community Foundation), the Town of Grafton, and the Town of Shrewsbury. GZA GeoEnvironmental, Inc. was hired to conduct a drawdown feasibility study with the purpose of significantly reducing the amount of aquatic vegetation in Lake Quinsigamond and Flint Pond.

The water quality of all municipal bathing beaches is certified annually by the Health Department. Nuisance vegetation, oily sheens, foul odors have been viewed as indicators of water quality degradation in some of the area ponds, but for the most part, water quality remains good.

C-1(c) Water Supply

The City of Worcester currently owns several surface water reservoirs for public water supply use within the Nashua River Basin and the Blackstone River Basin. Sources in the Nashua River Basin which serve the Worcester public water supply are the Quinapoxet Reservoir, the Pine Hill Reservoir, and the Kendall Reservoir. From the Blackstone River Basin, the City is served by surface water supplies in the Holden Reservoir #2, Holden Reservoir #1, Kettlebrook Reservoirs #1, #2, #3, and #4, and Lynde Brook Reservoir. All of these surface water reservoirs, and over 99% of the associated watershed acreage are located outside of the City of Worcester in the towns of Princeton, Rutland, Paxton, Leicester, and Holden. The City owns approximately 25% of the land surrounding surface water supplies and respective watersheds.

Additional sources of water include two gravel-packed wells which are currently used as emergency supplies. The Shrewsbury Well is located in the Town of Shrewsbury west of Lake Quinsigamond, while the Quinsigamond or Coal Mine Brook Well is located in Worcester on the shore of Lake Quinsigamond. Emergency water supplies are also available from the Massachusetts Water Resources Authority via connections to Wachusett Reservoir and the Quabbin Aqueduct.

In anticipation of future water demand growth, the City has applied for increased water withdrawals from its existing Blackstone Basin sources as required by the Massachusetts Department of Environmental Protection's Water Management Act. This application is currently under appeal. An application for increased withdrawals for the Nashua River Basin will be submitted in 1994.

For a number of years the city has been actively investigating potential new sources of water supply. The most promising of these is the development of additional groundwater wells in the vicinity of the Shrewsbury Well in the Lake Quinsigamond Aquifer. Two new well sites have been identified and are currently in the DEP New Source Approval process.

Table 4-1 Reservoir Acreage

High Service	Watershed Area (In Acres)	Low Service	Watershed Area (In Acres)
Lynde Brook	1,870	Holden Res.	3,248
Kettle Brook	2,314	Kendall Res.	1,569
Peter Brook	309	Pinehill Res.	4,415
		Quinapoxet Res.	12,704
<i>Total</i>	4,493	<i>Total</i>	21,936

Source: Worcester Watershed Overlay

Table 4 - 2 Reservoir Capacities and Surface Areas

High Service	Capacity (‘000Gals.)	Surface Water (Acres)	Low Service	Capacity (‘000Gals.)	Surface Water (Acres)
Lynde Brook	717,422	131.8	Holden Res. #1	720,319	129.8
Kettlebrook #1	19,307	11.5	Holden Res. #2	257,398	52.6
Kettlebrook #2	127,310	30.8	Kendall Res.	792,163	175.0
Kettlebrook #3	152,306	37.4	Pine Hill Res.	2,970,966	345.3
Kettlebrook #4	513,746	118.6	Quinapoxet Res.	1,100,000	280.0
<i>Total</i>	1,530,091	330.1	<i>Total</i>	5,840,846	982.7

Source: Worcester Watershed Overlay

Table 4-3 Water Supply Protection Organizational Framework

<u>Responsible Party</u>	<u>Water Supply Protection Responsibilities</u>
Department of Public Works	Water Treatment and Distribution Water Quality Monitoring and Watershed Patrols Site Plan Review Road Salting and Sanitary Surveys
Planning Board	Subdivision Regulations and Site Plan Approval Water Resources Overlay Protection District
Zoning Board of Appeals	Zoning, Earth Removal, Special Permits and Floodplains
Conservation Commission	Wetlands Protection Regulations Site Plan Review
Fire Department	Storage Approval – Flammable, Hazardous, or Toxic Materials and Site Plan Review
Department of Public Health and Code Inspection	Building Permits and Title V (Septic Systems) Subdivision Regulations and Site Plan Review Earth Removal and Floodplain Regulation Sanitary Surveys and Water Quality Monitoring
Traffic Engineering	Site Plan Review
Office of Planning and Community Development	Subdivision Regulations Site Plan Review Wetlands Protection Regulations Land Use Policy

Source: CDM, 1991.

C-2. Flood Hazard Areas

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map for the City of Worcester became effective on August 15, 1980. There are a total of twenty five (25) panels mapped for the City.

A section of the map was updated on December 16, 1992 due to the improvements which were completed in 1989 of the Combined Sewage Separation project completed by the Worcester Department of Public Works. The sewer modifications were associated with the Mill Brook Sewer Conduit which was designed to accommodate the existing one hundred (100) year flood discharge. The area of revision is referred to as the CARD district and covers the section north of Conrail, east of Main Street, South of Belmont Street, west of Interstate Route 290.

Table 4-4 Flood Hazard Elevations

Flood Hazard Location	Area	100 Year Flood Elevations (ft.)
Blackstone River	Corporate Limits	415.5
	Mill Brook Conduit	444.0
Middle River	Confluence of Blackstone River	444.0
	Conrail (Reaches 1-5)	460.5
St. John's Cemetery	Reaches 5 - 7	460.5
	Confluence with Curtis Pond	476.0
Beaver Brook	Beaver Brook	476.0
	Maywood Street	482.9
Kettlebrook (East)	Curtis Pond	476.3
	Leesville Pond	484.0
Kettlebrook (West)	Corporate Limits, Reach 1	520.8
	Reach 8	572.0
	Reach 9	600.0
	Reach 10	672.0
Tatnuck Brook	Confluence with Beaver Brook	482.0
	Patches Pond Res.	541.0
	Mower Street Bridge	592.0
	Before Dam	592.0
	Corporate Limits	656.0

Source: FEMA Flood Insurance Rate Map, 1980

C-3. Wetlands

The topography of Worcester's landscape was formed by faulting and folding of rock formations and the retreating of glaciers which formed deposits of glacial till in the form of drumlins, facing a southeast direction. These drumlins drain to the lower elevations and form streams with related vegetated wetlands, swamps, marshes and wet meadows such as the Broad Meadow Brook area, the Newton Square Peat Bog, the Jamesville "Pond", and the Blackstone River Valley.

The Department of Environmental Protection, in conjunction with the University of Massachusetts, has taken aerial photographs of the City at a scale of 1:12,000. They plan to delineate the wetlands on the color infra-red photographs, field check each wetland boundary, and make these photographs available to the City, hopefully by the year 1995. These photographs, in conjunction with the City's aerial photographs completed by the City Assessor's Office taken in 1988 at a scale of 1"= 600', will be useful in protection of wetland areas, assessing and planning future development within the City, and will aid in finding violations and effluent discharges into lakes and streams.

C-3(a) Vernal Pools

There are eleven 11 vernal pools in the City which have been certified by the Massachusetts Natural Heritage Program and Endangered Species, Division of Fisheries and Wildlife. Five of the Vernal Pools were certified as of 1992 and are located within God's Acres in the vicinity of Swan Avenue and southwest of Stratton Hill. Six Vernal Pools have been certified in Worcester since the completion of the 1994 Open Space and Recreation Plan. Four of the new vernal pools are located in the vicinity of Green Hill Park, one in the vicinity of Perkins Farm, and one in Broad Meadow Brook by Sprague Lane walk. The identification of vernal pools has been an ongoing priority in the City of Worcester and will hopefully be extended in the next few years through education and public participation.

Vernal Pools

According to the Massachusetts Natural Heritage and Endangered Species Program, vernal pools are temporary bodies of freshwater that provide crucial habitat to several vertebrates and many invertebrate species of wildlife. The invertebrates constitute a rich source of food for amphibian larvae, and also attract various species of birds, mammals and reptiles to vernal pools. To be protected by the Massachusetts Wetlands Protection Act, a pool must be certified by the Natural Heritage Program and must be located within a wetland resource area as defined in the Act.

C-4. Aquifer Recharge Areas

To protect potential new sources and the existing Shrewsbury and Quinsigamond Wells, the city adopted a Water Resources Protection Overlay District in April 1991. This addition to the Zoning Ordinance protects the quality and quantity of water supplying these wells by regulating land uses in the district overlying the aquifer and its recharge areas. Certain uses deemed to be a threat to groundwater are either prohibited or require issuance of a Special Permit depending on the nature of the use and the designation of the district area. The Zone GP-2 overlies the primary recharge area and includes the cone of depression and zone of contribution of the wells. Land uses are most strictly regulated in this region. Zone GP-3 covers areas that are upgradient of the primary recharge areas but which drain by surface water runoff and, to a lesser degree groundwater flow, to the primary recharge areas. Maintaining ample open space in both zones is key to protecting the integrity of the aquifer which supplies water to both Worcester and Shrewsbury.

D. Vegetation

D-1. Forest Land

The City of Worcester's naturally forested areas represent a zone of transition hardwoods-white-pine-hemlock identified by the Society of American Foresters. In this region, beech, birch, and maple overlap with the oaks and hickories that dominate the zone to the south. As a result, most of New England's native hardwood species occur here. Oaks and hickories, along with white pine, paper birch and aspen, usually occupy the hilltops and sandy areas. Northern hardwood and hemlock stands predominate on lower slopes. White pine is dominant in abandoned fields and sandy sites.

Protected Forest Land

Conservation Commission

Perkins Farm consists of 80 acres of young and mature woodland. The site provides hiking through birches, quaking aspens, white aspen, oak and chestnut trees. Several types of warblers and towhees can be seen during certain times of the year. In the fall, the hillside of the site provides an overlook to Lake Quinsigamond. The City has drafted a management plan for Perkins Farm with the assistance of the Massachusetts Audubon Society which will include trails, beautification, and educational projects, as well as trailhead and trail signs.

Dawson Road is a 37 acre forested parcel that the City of Worcester acquired through a tax foreclosure. The land is under the jurisdiction of the Conservation Commission whom provided a local match to fund the completion of a Forest Stewardship Plan in December, 1999 through a DEM grant. The parcel is densely forested, contains a small portion of wetland area and serves as habitat to a variety of wildlife. The parcel is marked for passive recreation purposes. The area is noted to be in fair to good condition, there are a variety of non-native species invading the parcel but are currently at a phase where they can be controlled before indigenous species are displaced. Selective harvesting is planned.

Cascades East is a 30.86 forested open space parcel that abuts the Cascades, which is a 36 acre preserved open space area. This parcel is a vital addition to the Cascades greenway corridor located in Holden and Worcester. The parcel is owned by the Conservation Commission with a Conservation Restriction held by the Greater Worcester Land Trust (GWLT) whom financed a majority of the required matching funds granted through DCS. This parcel is located within the Tatnuck Brook Watershed, which is a tributary to Patches Reservoir. Preserving this parcel will allow for infiltration and natural filtration of ground water and prevent a future increase of sedimentation deposit.

Institutional

At Clark University's **Hadwen Arboretum**, a variety of trees from all over the world were planted during the 1800's. Many of these trees, including tulips and sassafras can still be viewed at the Arboretum.

D-2. Rare, threatened and endangered species

The Massachusetts Natural Heritage and Endangered Species Program have identified two estimated habitat areas of rare wetlands wildlife on their 1993 Map of Estimated Habitats. The northernmost of the two areas is adjacent to a certified vernal pool. Rare, threatened and endangered species of plants have been included in Table 4-4 which follows sub-section E. Fisheries and Wildlife.

E. Fisheries and Wildlife

E-1. Inventory

The Division of Fisheries and Wildlife currently stocks Lake Quinsigamond and Coes Pond with rainbow and brown trout. Lake Quinsigamond is stocked with trout on seven to ten dates during the Spring (March through May) and on one or two dates in the Fall (October). The Lake is also stocked with discard brood stock Atlantic Salmon. These salmon are excess brood stock available on occasion from the co-operative State and Federal programs to restore Atlantic Salmon to the Merrimack and Connecticut Rivers. Also, Northern Pike are stocked in Lake Quinsigamond and Indian Lake. These lakes are stocked with pike every three to four years. The City of Worcester currently does not stock any of its ponds or lakes.

According to the April 1982 DEM Watershed Management Plan for Lake Quinsigamond and Flint Pond, the following fish species are known to reproduce within the warm and cool water fisheries of Lake Quinsigamond:

black crappie	brown bullhead	largemouth bass	pumpkin-seed sunfish
white perch	yellow perch	bluegill sunfish	carp
chain pickerel	smallmouth bass	white sucker	banded killfish
rainbow smelt			eastern brook trout

Lake Quinsigamond holds the current state record for common carp (42 lbs. in 1988), and held previous records for both northern pike and tiger muskellunge. Coal Mine Brook has recently been designated as a cold water fishery by the Massachusetts Division of Fisheries and Wildlife.

In addition to a diverse fisheries population, the less populated sections of the City provide habitat for deer, fox, raccoons, coyotes and occasionally moose.

E-2. Corridors

Under the Section 22 Planning Assistance to the States Program and the Coastal America Initiative, the Corps of Engineers was recently requested by the States of Massachusetts and Rhode Island with the support of the Blackstone River Valley National Heritage Corridor Commission to conduct an investigation into the feasibility of restoring anadromous fish (chad and salmon) to the Blackstone River watershed through assessment of both spawning and nursery areas as well as water quality and quantity. Additionally, the Massachusetts Division of Fisheries and Wildlife is very interested and active in waterfowl habitat restoration along the Blackstone River. Identification and mapping of all potential sites for potential habitat restoration and dam restoration was added to the project's scope of work.

E-3. Rare, Threatened and Endangered Species

According to Massachusetts Natural Heritage Program Staff, the wood turtle (*Clemmys insculpta*), a "special concern" species in Mass., has been identified in the Lake Quinsigamond resource area. Directly north of Lake Quinsigamond, the Wachusett Reservoir provides habitat for the bald eagle, an endangered species listed by the U.S. Fish and Wildlife Service.

Table 4-4 Rare, Threatened and Endangered Species

Scientific Name	Common Name	Town Name	First Observed	Last Observed	DFW Rank
Accipiter Striatus	Sharp-Shinned Hawk	Worcester	1879	1880-06-28	SC
Adlumia Fungosa	Climbing Fumitory	Worcester	1938	1938-06-13	T
Ambystoma Opacum	Marbled Salamander	Worcester	1927	1990-09-25	T
Arethusa Bulbosa	Arethusa	Worcester	1879	1879-06-30	T
Asclepias Purpurascens	Purple Milkweed	Worcester	1879	1879-06-30	T
Bartramia Longicauda	Upland Sandpiper	Worcester		1960-Summ	E
Carex Lenticularis	Shore Sedge	Worcester	1933	1933-06-23	T
Castilleja Coccinea	Indian Paintbrush	Worcester		1940-PRE	H
Certified Vernal Pool		Worcester	1989	1989-Spring	
Certified Vernal Pool		Worcester	1989	1989-Spring	
Certified Vernal Pool		Worcester	1989	1989-Spring	
Certified Vernal Pool		Worcester	1989	1989-Spring	
Certified Vernal Pool		Worcester	1990-09-2	1991-09-25	
Cicindela Purpurea	Purple Tiger Beetle	Worcester		OOOO	SC
Clemmys Guttata	Spotted Turtle	Worcester	1991	1991-04-13	SC
Clemmys Guttata	Spotted Turtle	Worcester		1892	SC
Crotalus Horridus	Timber Rattlesnake	Worcester		1700's	E
Eacles Imperialis	Imperial Moth	Worcester		1934-PRE	SC
Hydrophyllum Candense	Broad Waterleaf	Worcester	1933	1934-08-22	E
Lasiurus Cinerus	Hoary Bat	Worcester	1800's	1800's	WL
Lygodium Palmatum	Climbing Fern	Worcester	1879	1897	SC
Myotis Sodalis	Indiana Myotis	Worcester	1931	1937-09-08	E
Ophioglossum Vulgatum	Adder's Tongue Fern	Worcester	1933	1933-07-15	T
Penstemon Hirsutus	Hairy Beardtongue	Worcester		1890	E
Platanthera Flava Var Herbiola	Pale Green Orchis	Worcester	1939	1939-06-28	T
Sorex Palustris	Water Shrew	Worcester	1880's	1880's	SC
Speyeria Idalia	Regal Fritillary	Worcester		1934-PRE	E
Terrapene Carolina	Eastern Box Turtle	Worcester	1992-06-01	1992-06-13	SC
Key to Ranking System:		E = Endangered	SC = Special Concern		H = Historical
		T = Threatened	- WL = Watch List		Delisted = -

F. Scenic Resources and Unique Environments

F-1. Scenic Landscapes

The Massachusetts Landscape Inventory (MADEM, 1982) does not specifically identify any areas within the City. Pockets of noteworthy and even distinctive scenic features exist. The following are primary examples of Worcester's natural resources which do not fall into the urban classification described by MADEM:

Broad Meadow Brook Wildlife Sanctuary

Broad Meadow Brook is the largest urban wildlife sanctuary in New England. The Massachusetts Audubon Society manages 272 acres of oak woods, fields, old pasture, streams, marsh and swamp for wildlife habitat and nature education. Broad Meadow Brook is owned by a consortium comprised of the City of Worcester Conservation Commission, the New England Power Company, and the Audubon Society itself. The 272 acres are used as an outdoor classroom throughout the year, with a strong emphasis on reaching those who are underserved by environmental organizations elsewhere. There are species of approximately 155 birds, 67 types of butterflies. fox, coyotes, deer, minx and muskrats are also present. Broadmeadow Wildlife Sanctuary is a fire adapted plant community, of both upland and wetland species. The Sanctuary also offers a variety of classes for adults and children in the identification of flora and fauna.

Coal Mine Brook - The old Worcester Coal Mine is located on Plantation Street in the eastern central portion of the City. During the early 1800's, the coal was mined and sent by rail to Lake Quinsigamond, where it was then shipped to southern portions of the Blackstone Valley. The mine shaft opening has collapsed, however, the coal is still visible. The nearby brook (Coal Mine Brook) is a trout and smelt spawning run and has recently been designated as a cold water fishery by the Massachusetts Division of Fisheries and Wildlife.

The Cascade Green Belt - Located in the northwestern section of Worcester, this site is comprised of approximately 300 acres of woods owned by the Worcester Parks Department and the Greater Worcester Land Trust in Worcester and neighboring Holden and Paxton. It contains two waterfalls, large boulders, and a mature hardwood forest. There are several trails in Worcester and Holden which the public may access for hiking, picnicking, and exploring wildlife and vegetation. Among the wildlife in the Green Belt are: the giant pileated woodpecker, turkeys, owls, deer, and salamanders. There are also mountain laurels and silver beech.

Crow Hill – is a 42.1 acres parcel located off of Plantation Street at the terminus of Clarendon Street. The City of Worcester Conservation Commission has obtained ownership of 27.9 acres of the parcel through funding made available by the Greater Worcester Land Trust whom have placed a conservation restriction on the parcel. A grant application is pending through the EOEA, DCS Land and Water Conservation funds for the remaining 14.2 acres. The parcel is forested and contains approximately two acres of wetlands surrounding a small pond.

F-2. Cultural and Historic Areas

F-2(a) Local Historic Districts

1. **Massachusetts Avenue Historic District** is listed as both a National Register and local historic district. Located near Salisbury Park, it is characterized by a variety of mid-19th century residential architectural styles.
2. **Montvale Historic District** is a broader interpretation of the Montvale National Register District established in 1978. It is bordered by Park Avenue, Salisbury Street and Forest Street, and the Massachusetts Avenue Historic District is located to the South. A residential area, most of the homes in the Montvale District were built in the late Victorian and Greek Revival traditions of the first quarter of the 20th century.

F-2(b) Historic Parks

1. Elm Park

Originally called "New Common", the original 27 acres of Elm Park were purchased in 1854. From 1874 to 1884 the basic plan for the park was put in place; pools, walks, and bridges were established for passive recreation pursuits. In 1888, Newton Hill was purchased as an addition to the park, yet has remained as a separate "rustic" unit. In 1910, the Olmsted Brothers landscape architecture firm was hired by the City with an emphasis on playground planning. In 1970, the park was designated as a National Historic Landmark and a complete renovation was accomplished in the mid-1970's.

2. Blackstone River and Canal Heritage State Park

Historical resources identified in the Technical Feasibility Study and Implementation Strategy for the Heritage State Park include the Blackstone Canal, Quinsigamond Mill Complex, U.S. Steel Buildings, and remnants of a set of historical engineering structures including the Quinsigamond Dam, former Mill Pond and associated waterways. The Washburn and Moen Wireworks building has been designated as the future site of the Blackstone Canal Visitor's Center. This site will promote tourism and house a variety of commercial and educational uses. DEM is converting the abutting property to park land. Taken together and used for an interpretive site, these resources have the potential to graphically emphasize the importance of natural/geographic determinants in the development of the area.

3. Cider Mill Park

Cider Mill Pond was once the home of Solomon Parsons and is both historically and naturally significant. It was the location where the pre-Civil War underground railroad took passengers to hide in Mr. Parson's home on their way north. Species of the original landscaped red cedar, Japanese yew, rosa florabunda, bittersweet, and forsythia can still be viewed. The City has once again formed a partnership with the Greater Worcester Land Trust to purchase approximately 33 acres for parkland.

F-2(c) Evaluation of Known Threats to Historic Resources

Many of the city's historic resources are directly or indirectly threatened by development pressures, and shifts in the economy and development patterns. A number of historic resources may be at risk either by neglect, development forces or other threats. At risk resources include mill complexes and associated mill housing and community service buildings, individual or isolated structures, cemeteries and graveyards, and archaeological sites.

Mill complexes in Worcester, including associated housing and other buildings, are an important and visible element of the City's historic resources. Many structures have been updated and changed over the years so that only remnants of the original buildings remain, while others have disappeared entirely. Vacant mill structures are threatened unless they are put to uses which will promote their survival. Marginal uses do not yield the type of revenue needed to protect the integrity of the structures. The condition of structures left vacant may disintegrate to the point where only massive public support will save them. To help prevent demolition of historic structures the City of Worcester adopted a Demolition Delay Ordinance in June of 1997. This ordinance provides jurisdiction to the Worcester Historical Commission to enforce a six month demolition delay period on buildings that are included on the state MACRIS list. This demolition delay allows six months for state agencies and other interested parties, such as Preservation Worcester, to find alternatives to demolition. In addition, the City of Worcester received a grant in 1999 from the Massachusetts Historical Commission to hire a historical consultant to update the state MACRIS inventory list and prepare eligibility criteria for 85 new structures to be included on the National Register of Historic Places.

F-2(d) Blackstone River Valley National Heritage Corridor

"The Blackstone River Valley National Heritage Corridor is unlike a traditional park or historic site where people come to view historic or natural resources. The Corridor seeks to preserve nationally significant cultural and natural assets right where the people of the Blackstone Valley actually live and work. The concept salutes their proud and common heritage.

*- Richard Moore, former Chairman
Blackstone River Valley National Heritage
Corridor Commission*

1. Blackstone River Valley National Heritage Corridor

In November 1986, Public Law 99-647 was passed by the 99th Congress, establishing the Blackstone River Valley National Heritage Corridor in Massachusetts and Rhode Island. The legislation established a guiding commission for the Corridor's administration as well as boundaries and mission. In 1989, the Heritage Corridor produced a Cultural Heritage and Land Management Plan which established a guiding action plan for the Corridor with an emphasis on public-private partnerships. Legislation to expand the Corridor's boundaries to include most of the City of Worcester as well as four other communities in Massachusetts and Rhode Island. The City of Worcester is currently working with the Blackstone River Valley National Heritage Corridor Commission to promote the scenic corridor by developing a Visitor's Center, park land, bike and pedestrian paths.

2. Route 146 / Massachusetts Turnpike Connector

City and State agencies are currently engaged in the reconstruction of Route 146 between I-290 and the Massachusetts Turnpike. The project will turn Route 146 into a four lane limited access highway. A new interchange at the junction of 146 and the Massachusetts Turnpike has recently been completed and is also the new site for a park and ride facility to promote car pooling and decrease green house gas emissions. In addition to improving the area's transportation network, the "parkway" characteristic of this project has the opportunity to improve environmental conditions in the area. For instance mitigation efforts will create additional wetlands, improve erosion and sedimentation control, while minimizing the effects of highway runoff. Also, a large number of environmentally hazardous properties are located along the corridor. Many of these will be cleaned up as a result of the project.

3. Route 146 Bikeway

A substantial feature of the new Route 146 is the bikeway that will stretch from Brosnihan Square to Route 122A in Millbury. Approximately three quarters of the bikeway will be independent of Route 146. Although it is still in the design stages, eventually the bikeway will become a component of the regional Blackstone Heritage Corridor Bikeway. There is a proposal to extend the bikeway further into the City linking it to the revitalized Union Station via the Brosnihan Square Gateway I road redesign project. The Department of Environmental Management is also investigating the possibility of locating a canoe launch along Middle River, which will connect to the bikeway and the Washburn Moen building, which is the site for the proposed Visitor's Center.

F-3. Areas of Critical Environmental Concern

There are currently no Areas of Critical Environmental Concern (ACEC) designated by the Executive Office of Environmental Affairs (EOEA). In December, 1992 the City of Worcester attempted to have a 6,766 acre portion of the Lake Quinsigamond Aquifer Resource Area designated as an ACEC by the EOEA. The area nominated included a portion of the City of Worcester, and the Towns of Shrewsbury, Boylston, Grafton, West Boylston and Millbury. According to DEP water management data, the present yield from the proposed ACEC exceeded nine million gallons per day. The area is also the principal source of recharge to an extensive surface water complex of lakes and ponds and vegetated wetlands. In addition, the area is situated in the headwaters of the Blackstone River and is a regionally important wildlife migratory corridor.

However, in a 1993 letter to the City Manager, the Secretary of Environmental Affairs declined to review the area for designation because "the high level of development and urbanization located within the area reduces the number of highly significant resource components and fragments the integrity of critical ecological relationships necessary for ACEC designation."

G. Environmental Problems (Potential Sources of Environmental Degradation)

The City's natural resources are threatened by development within groundwater recharge areas; runoff from roads, parking lots and golf courses; poor septic system maintenance; and an increasing number of failing and leaking storage and disposal facilities. Generally, as

development pressure increases, so does the intensity of the land use, increasing the odds for contamination from any number of resources. With only an estimated 15% open space remaining in the City, local regulatory methods of resource protection have been put into place to “slow the tide” of degradation and maintain and improve the quality of its natural resources.

G-1. Hazardous waste sites

In accordance with the provisions of the Massachusetts Contingency Plan (MCP - 310 CMR 40.00) and the Massachusetts Superfund Law (MGL c. 21E, enacted in 1983), 209 sites of oil and/or hazardous materials releases have been identified in Worcester. The focus of MCP and 21E include DEP emergency response, site discovery, cleanup oversight, public information and compliance with standards and guidelines. Sites are given a status according to DEP regulations. Of the 209 state listed sites, 9 have received “priority” status.

Potential hazardous waste sites have been inventoried by DEP and USEPA under the Comprehensive Environmental Response and Liability Information System list (CERCLIS) as required under the Comprehensive Environmental Compensation and Liability Act of 1980 (CERCLA). Following preliminary assessments and site inspections, those locations deemed to represent an immediate threat to public health and safety are elevated to the National Priority List and are commonly referred to as "Superfund" sites. Although the City boasts extensive industrial development, Worcester is fortunate to be relatively free of documented sites.

Ten CERCLIS sites have been mapped and roughly assessed in this analysis for their potential impacts. Of the ten, several have been dismissed as having no significant impact on- or off-site based upon preliminary investigations completed to the satisfaction of EPA and DEP. Other sites are currently under both 21E and CERCLIS jurisdiction and will receive further investigation or remediation. No sites have the potential to reach a significant level on the National Priority Listing unless significant impacts are discovered or assessed.

Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 established reporting requirements to provide the public with information on hazardous chemicals in their communities, and on development of state and local emergency response plans. Under its National Pollutant Discharge Elimination System permit application, the City has proposed stringent review of facility inspection results and ownership tracking for listed facilities.

Patriot Metals

This metals "recycling facility" occupies a filled site on the banks of a former Blackstone River steel mill, located on Ballard Street. The facility contained an automobile shredder residue storage area which temporarily stored roughly 4,000 tons of solid waste materials, some of which were considered hazardous, before materials are landfilled. Site Assessments indicated that groundwater contamination from the industrial facility was minimal for metals, petroleum hydrocarbons, and polynuclear aromatic hydrocarbons. Stormwater from the site discharged into the City's sewer system. The current site of the Patriot Metals facility, located off of Ballard Street, was taken by the Massachusetts Highways Department for construction of the Route 146 project. A new Patriot Metals site is currently being constructed at the southern terminus of Greenwood Street. The new site will be equipped with all of the latest technological equipment which will significantly decrease contamination. The old site will soon be cleaned, the contamination of the property was less severe than expected. A portion of the land will be given to the Department of Environmental Management and converted to parkland, the remainder of the land will be targeted by the City of Worcester as a future site for an industrial park.

G-2. Landfills

DEP regulations require that a post-closure permit be retained for any proposed landfill re-use. Post-closure uses are restrictive because of concerns about the integrity of capping, instability of surface and presence of methane and other gases. No active re-use has been proposed for any of the City's landfills to date. Some unregulated "disposal areas" within City parks such as Cascades, Apricot Street and Columbus Parks should be investigated further and proper disposal of materials implemented.

Greenwood Street.

This 90 acre landfill was closed in accordance with a DEP closure permit in 1986. The site is presently monitored for gas content and groundwater quality. A program for methane gas "harvesting" is being studied in accordance with the Clean Air Act Amendments. Problems noted by Public Works personnel include settling, vegetation growth, and gas venting too close to adjacent properties. Regrading, mowing and continued monitoring comprise the ongoing mitigation measures at the site. In addition to the landfill, this "campus" site also contains some old public works remnants as well as some sludge drying areas.

Ballard Street.

Approximately 55 of the 72 acre landfill site has been capped and catch basins and swales have been installed greatly reducing the amount of leachates entering the City's stormwater system. The remaining acreage is presently functioning in a limited capacity, accepting only street sweepings and catch basin cleanings. The site is expected to be utilized until September of 2000 at which time a closure permit from the DEP must be obtained. No monitoring of air or groundwater quality is presently underway.

Green Hill Landfill.

This 18-acre site is an example of passive re-use of a capped municipal solid waste landfill site. The site was originally developed as a rock quarry and filled with miscellaneous debris and sanitary refuse. An informal soccer field has been constructed in the area of the former landfill which was operational from 1964 to 1973. The site is located within the municipally owned and operated 432-acre Green Hill Park, a multiple use facility located in the eastern central portion of the city.

G-3. Erosion and Sedimentation

Sediment loading from urban runoff results in reduction of aesthetic values, increased turbidity, and smothering of benthic communities. Sediment is also an efficient carrier of toxins and trace minerals that change the composition of the bottom substrates of receiving waters. Soil erosion caused by uncontrolled road runoff and sand applied to highways as a de-icing agent are additional sources of sediments deposited into waterways.

Slopes greater than or equal to 15% are regulated within the City's Site Plan Approval provisions of the Zoning Ordinance and additionally, those slopes greater than or equal to 40% are under the jurisdiction of the Wetlands Protection Ordinance as well as the City's Subdivision Regulations. Construction impacts are reviewed by the Planning Board as well as various City departments for each petition. The City's Department of Public Works presently uses Soil Conservation Service

guidelines (Methods for Controlling Peak Discharge From Urban Areas) as well as the University of Delaware Water Resources Handbook (Water Resource Protection Measures in Land Development) as standards for review, linking stormwater management techniques with erosion and sediment control practices. Best Management Practice design and performance standards should be developed for use by the Planning Board and Conservation Commission in their plan review (Section 3.2.3 of the City's Wetland Protection Regulations establishes only general performance standards for review).

Smith Pond

The site of Smith Pond is currently a large wetland with Tatnuck Brook flowing through. The pond was filled by sediment and siltation from development runoff on Airport Hill. The siltation was generated from miles away in some instances and conveyed to the pond (its first settling point) through the City's stormwater system.

G-4. Chronic Flooding

Worcester joined the regular portion of the National Flood Insurance Program in 1980. The purpose of the flood insurance study completed by the Federal Emergency Management Agency is to investigate the existence and severity of flood hazards in the City and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Worcester Zoning Ordinance also includes a Floodplain Overlay District which regulates development within flood hazard areas identified on Flood Insurance Rate Maps. Development proposals within this overlay district are subject to a site plan review procedure before the Planning Board. Uses not allowed in the underlying district may be granted a variance by the Zoning Board of Review if stringent performance criteria are met.

The Route 146/Massachusetts Turnpike Interchange Project for Worcester and Millbury provides an opportunity to correct some drainage problems within the south central portion of the City, including Brosnihan Square, Green Island, Southbridge Street as well as Ballard and Millbury Streets. Improvements are scheduled to be included as part of the Route 146 contract to the Mill Brook Conduit in Brosnihan Square to reduce flooding in these areas. The Conduit will convey stormwater southerly to its outlet at the Blackstone River. Other areas of historic flooding (i.e. Webster Square and the Tatnuck Brook Watershed) have been addressed by retrofit of the City's storm drain system by the DPW and/or Army Corps of Engineers.

Additionally, the US Army Corps of Engineers 1960 Worcester Diversion Local Protection Project is located in Millbury and Auburn as a result of the record flood of August 1955 which caused extensive damage in the City. Authorized by Congress in December 1944 through the Flood Control Act of 1944 for local flood protection on the Blackstone River at Worcester. Major project components consist of a control dam at Leesville Pond, an intake weir and transition section, a concrete lined diversion tunnel, and an open return channel leading to the Blackstone River. The function of this project is to permit return flood flows originating in the Kettle Brook drainage area to bypass the City of Worcester by conducting them to the Blackstone River. The area protected by the Project consists of dense industrial and residential areas, including over 100 homes, 50 stores and 20 manufacturing plants (US Army Corps of Engineers, 1990).

Several of the City's dams have also been the subject of the National Dam Inspections Program - Phase 1 by the Army Corps of Engineers. Several have been assessed as being in a hazardous state by the Massachusetts Office of Dam Safety, including the targeted Coes Reservoir Dam (part of the Coes Knife Company Site).

G-5. Ground and Surface Water Pollution

Urban Runoff Areas

The City is currently in the second year of its 5-year NPDES Stormwater Permit, one of only two municipal Stormwater Permits in the Northeast. In accordance with the Clean Water Act, the City has implemented a Stormwater Management Program (SWMP), comprised of a wide variety of Best Management Practices (BMP's), which are designed to improve the quality of stormwater discharges from the municipal separate surface sewer system. The BMP's include illicit connection detection and removal; rehab of twin-invert manholes to prevent cross-contamination of sanitary and storm flows; construction site runoff management; and annual household hazardous waste collection day; a substantial public education program; as well as regular operation and maintenance activities such as catch basin cleaning and street sweeping, etc.

The public education BMP includes informational pamphlets distributed at public events; a newsletter distributed with water/sewer bills; informational meetings; sponsorship of school projects ranging from grammar school to Master's thesis; installing signs where culverted waterways cross City street to raise awareness; catch basin stenciling' as well as partnering with local advocacy groups such as Mass Audubon, Regional Environmental Council and Blackstone Headwaters Coalition. Additionally, as part of the SWMP, DPW will be investigating one watershed per year to isolate and eliminate pollution sources.

Combined Sewer Overflows

The City's sewer maintenance program includes catch basin cleaning, sewer flushing, sewer scraping, inflow/infiltration surveys, and on-going sewer separation efforts. Through numerous contracts in the late 1970's and 1980's, the City undertook significant modifications to its sanitary and storm drain system. The objective of those contracts was to alleviate Combined Sewer Overflows to the Blackstone River by constructing separate conveyances for sanitary sewage flows, overflow relief collectors, and a Combined Sewer Overflow Treatment Facility.

Upper Blackstone Water Pollution Abatement District.

The Upper Blackstone Water Pollution Abatement District is also regulated by EPA under the National Pollutant Discharge Elimination System and has been issued a permit pursuant to the Clean Water Act, as amended, and the Massachusetts Clean Waters Act, 21 M.G.L. as amended. Additionally, the facility is regulated by a Massachusetts State Water Quality Certification as issued by the Massachusetts Division of Water Pollution Control. EPA proposed new limits for toxic metal pollutants and chlorine discharged into the Blackstone River.

The facility's discharge into the Blackstone River nearly doubles the quantity of water within the River's channel and the facility, despite years of compliance with water quality regulations and permit requirements, it is the largest source of pollutants to the Blackstone and the upper Narragansett Bay. The facility treats industrial and residential sewage from Worcester and several surrounding communities and has developed an industrial pre-treatment process on-site in response to changing water quality regulations. The plant had not been required to meet specific total limits for toxic metal pollutants such as zinc, cadmium, nickel and copper in the past and appealed the permit as drafted. Additional industrial pre-treatment for those industrial waste waters sent to the plant would be required on an individual plant basis, a process requiring additional monitoring and pre-treatment equipment.

Sanitary Surveys

Annual sanitary surveys are completed by the City in fulfillment of DEP's Drinking Water Regulations. A list of registered RCRA facilities was compiled from the EPA's Hazardous Waste Data Management System database and is maintained and investigated by DPW staff.

G-6. Development Impact

Salt Storage Sites and Road Salting Areas

Worcester uses a sand/salt mix on its roads. Storage of ice control chemicals in quantities of greater than one ton and the disposal of snow containing de-icing chemicals are prohibited in the GP-2 portion of the Zoning Ordinance's Water Resources Protection District and permitted by Special Permit in the GP-3 area.

Industrial Facilities

Approximately 20% of the City's land area is zoned for industrial uses. Several non-conforming uses within vulnerable ecological areas have posed problems for the City over time and have provided good cases for more environmentally protective land use regulations with strong performance-based criteria.

Underground Storage Tanks

Oil and other petroleum products contain a wide array of toxic hydrocarbon compounds. DEP has enacted regulations concerning the design, installation, maintenance, monitoring and failure of underground storage tanks. Current DEP programs focus on release prevention and correction. The regulations apply to new, existing and abandoned facilities at which petroleum and/or hazardous materials serving industrial, commercial, educational or governmental operations are stored underground. Recent amendments to the City's Zoning Ordinance prohibit the replacement or installation of underground storage tanks within the City's Water Resources Protection District.

Junkyards

On-site and leaching fluids are the potential sources of contamination from junkyards and abandoned vehicles. These fluids include oil, brake and transmission fluid, anti-freeze/coolant, battery acid and gasoline. Several "recycling" facilities have continual adverse impacts on ground and surface waters in the area. Water quality monitoring required under the State Contingency Plan and MGL 21E regulations show degradation with little mitigation.

Pesticide or Fertilizer Application Areas

Easements for power lines or other public utilities, railroad beds, and golf courses are primary sites for pesticides and fertilizer application because of the intensive maintenance requirements of the land uses. The City has three golf courses, two private facilities and one public (managed by the Parks Department). Applications to public utility rights-of-way are regulated by the state's pesticide and herbicide program, where annual maintenance programs are submitted for review and permitting. New utility installation is subject to local wetland regulation provisions.

Non-Sewered Areas

The City's Department of Health and Code Inspection estimates that 2,500 septic systems remain within the City limits. According to the latest Public Works Department sewer service area, many of the systems are located in the outskirts of the City or off private streets not serviced. Within the last five years, a very large system was installed off Ballard Street in close proximity to the Blackstone River and is being monitored by the Health Department.

SECTION 5 - CONSERVATION AND RECREATION LANDS

A. Protected Land

A-1. Private Parcels (See Map 4 in Appendix B)

- **Forest Lands Under Chapter 61**

Chapter 61 of the General Laws was enacted to encourage the preservation and development of the Commonwealth's productive forest land. If forest land qualifies for classification under Chapter 61, it will be taxed exclusively under the provision of that chapter and will be exempt from full value property taxation. In order to qualify: 1) the land must consist of at least 10 contiguous acres of "forest land," 2) the state forester must certify that the land is managed under an approved 10 year rest management plan and 3) a timely and completed application for classification must be submitted to the assessors. Assessed valuations are 5% of the "full and fair cash valuation" of the property or \$10 per acre, whichever is greater, plus an additional products tax of 8% on the actual products (timber) cut.

<u>Owner</u>	<u>Location</u>	<u>Acreage</u>
Clarkson	Moreland St.	21.16 acres
Chase	Grove Street	46.56 acres
Donker	Toryfort Lane	20.00 acres

- **Agricultural Lands Under Chapter 61A**

Chapter 61A – A constitutional amendment approved by the voters of the Commonwealth in 1972 authorized the General Court to provide for the valuation and taxation of agricultural/horticultural land based solely upon the land's agricultural/horticultural use. The purpose of assessing agricultural/horticultural land solely on the basis of the current use it to promote the development and conservation of agricultural/horticultural lands, lands considered to be a valuable resource of the Commonwealth. Qualifications are: 1) the land must be "actively devoted" to agricultural/horticultural uses, i.e. satisfy the use, size and gross sales requirements, 2) the parcel must be of at least 5 contiguous acres, 3) the gross sales from the land actively devoted to agricultural/horticultural uses must be \$500 or more per year and 4) the land must be actively devoted to agricultural/horticultural uses for at least 2 tax years immediately preceding the year for which classification is sought. The valuation of Chapter 61A properties is in accordance with Department of Revenue guidelines published on an annual basis. The range currently begins at \$35 an acres of non-productive land to \$19,080 per acres for "above average" productivity for cranberry productions.

<u>Owner</u>	<u>Location</u>	<u>Acreage</u>
Barys	Rydberg Terrace	6.73 acres
Ence	Airport Drive	5.00 acres

- **Open-Recreational Lands Under Chapter 61B**

Chapter 61B Chapter 61B of the General Laws provides some measure of tax relief to land utilized for certain qualifying “recreational” purposes. Chapter 61B provides a tax benefit by classifying land, when appropriate, as “recreational land” and taxing it exclusively under the provisions of Chapter 61B. Under this Chapter, recreational land is valued and assessed on the basis of its present use rather than upon its full and fair value, and in no event may the valuation exceed 25% of the full and fair value. Land will qualify if it consists of five or more acres and is retained in a substantially natural, wild or open condition or in a landscaped condition, provided the condition of the land allows to a significant extent the preservation of wildlife and other natural resources. The above land need not be open to the general public for qualification. Land of five or more acres may also qualify solely on the basis of its recreational use, provided such use does not materially interfere with the environmental benefits derived from the land and the land must be made available either to the public or to members of a non-profit organization. The only qualifying recreational uses are: hiking camping nature study and observation, boating golfing, horseback riding, hunting fishing, skiing, swimming, picnicking, private non-commercial flying, hang-gliding, archery or target shooting.

<u>Owner</u>	<u>Location</u>	<u>Acreage</u>
Tatnuck Country Club	Pleasant Street	165.47 acres
Worcester Country Club	Rice Street	235.56 acres
Smith’s Pond Co.	Cooks Pond	22.60 acres
Courtney	Brigham Road	9.00 acres
Estabrook	Massasoit Road	5.80 acres
Schmitt	North Bend Road	5.22 acres

A-2. Public Conservation and Recreation Resources

Commonwealth of Massachusetts

Owner	Acres
Quinsigamond State Park	9.6
Vernon Hill Playground Pool	1.4
Regatta Point State Park	
Bennett Field State Pool	
<i>Total</i>	11.00

City of Worcester

Conservation Commission

Location	Acres
Patch Reservoir	52.9
Sherer Trail	13.4
Broad Meadow Brook	143.0
Dallas Touraine	12.4
Patch Pond	6.4
Carter Road	14.0
Perkins Farm	80.0
Miscoe Estates (Parcel A)	0.8
Rosewood Estates (Lot 19)	4.7
God's Acre (Airport Commission)	91.82
Dawson Road Conservation Area	37
Empire Street	.173
Everton Avenue (Broad Meadow Brook)	54.17
Pennsylvania Ave (Broad Meadow Brook)	20.2
Hjelm Ave. (Broad Meadow Brook)	3.9
Julien Ave	.6
Massasoit Road (Broad Meadow Brook)	48.1
Glendale Street (Patches Reservoir land)	6.4
Cascades East	30.86
<i>Total</i>	620.823

Parks Department Facilities (Detailed inventories in Appendix A)

Location	Acres
Apricot School Playground	2.4
Bailey Prouty Playground	1.0
Banis Street Playground	0.5
Beaver Brook Park	12.8
Bennett Field (Playground)	6.7
Blithewood Ave. Playground	1.0
Boynton Park	114.6
Burncoat Park	27.6
Burncoat Street Playground	1.3
Cascades Park	70.7
Chandler Hill	32.3
Cider Mill Pon	24.0
Coes Pond Beach	1.8
Columbus Park	8.6

Common	4.4
Cookson Field	18.9
Crompton Park	14.6
Dodge Park	13.0
Elm Park	60.0
Fairmont Park	0.9
Farber Field	4.1
Grant Square Playground	1.5
Great Brook Valley Playground	6.9
Green Hill Park	432.1
Greenwood Park	14.8
Hadwen Park	45.4
Harrington Field	6.0
Harry Sherry Field	4.9
Holland Rink Playground	8.0
Holmes Field	8.0
Indian Lake Beach	1.6
Institute Park	24.6
Kendrick Field Playground	5.1
Lake Park	75.6
Lakeview Playground	1.2
Logan Field	11.3
Middle River Park	8.1
Morgan Landing	11.2
Mulcahy Field	3.4
Oakland Heights Playground	1.5
Oread Castle Park	3.1
Ramshorn Island	1.5
Rockwood Field	15.78
Salisbury Park	11.79
Shale Street Playground	0.78
Shore Park	6.8
Tacoma Street Playground	15.0
Ty Cobb Field	11.0
University Park	13.0
Vernon Hill Park	13.7
Wetherell Estate	6.7
<i>Total</i>	1191.55

B. Unprotected Land

B-1. Private recreation land

Owner	Acres
Worcester Country Club	186.0
Tatnuck Country Club	167.5
Greendale YMCA	10.0
Knights of Columbus (Coes Pond Beach)	15.0
Worcester Jewish Foundation	0
Worcester Tennis Club	1.2
Dorman-Benedict Farm*	33.92
<i>Total</i>	413.62

* - Was under APR, but has been “lost” as a result of the development of the Biotech Park. An agreement releasing the property from its protected status has been signed recently as a result of MEPA review.

B-2. Major Institution Holdings

Owner	Acres
Assumption College	20.2
Bancroft School	13.1
Clark University (includes Hadwen Arboretum)	6.4
Holy Cross College	29.0
Worcester Academy	14.0
Worcester Polytechnic Institute	10.3
<i>Total</i>	93

B-3. School Department Recreation Facilities

Senior High Schools

Location	Total Area (acres)
Burncoat	38.9
Doherty	20.1
New North High School	19.6
South	41.0
<i>Total</i>	119.6

Junior High Schools

Location	Total Area
Chandler	22.0
Forest Grove	28.6
Worcester East	2.0
Foley Stadium	13.7
<i>Total</i>	66.3

Elementary Schools

Location	Total Area (Acres)
Adams Street	1.3
Burncoat Street	1.9
Chandler	1.4
Clark Street	20.3
Dartmouth Street	0.9
Downing Street	0.8
Flagg Street	9.9
Freeland Street	0.7
Gage Street	0.9
Gates Lane	1.4
Grafton Street #1	1.2
Grafton Street #2	1.6
Granite Street	2.0
Greendale	1.0
Harlow Street	0.7
Heard Street	5.2
Lake View	1.9
Lincoln Street	6.3

Ludlow Street	5.2
May Street	2.0
Midland Street	0.6
Millbury Street	1.1
Mill-Swan	6.3
Nelson Place	9.5
Norrback	4.6
Quinsigamond #2	1.9
Quinsigamond #3	4.0
Rice Square	2.2
Roosevelt	2.6
St. Nicholas	10.3
Tatnuck	3.6
Thorndyke Road	2.0
Union Hill #1	0.6
Union Hill #2	0.6
Vernon Hill	13.8
Wawecus Road	4.4
West Tatnuck	37.0
Woodland Street	1.2
Elm Park	4.2
Belmont Community	6.5
South Community	41.0
<i>Totals</i>	224.6

B-4. State Institutions

Location	Acres
Quinsigamond Community College	50.9
University of Massachusetts Medical Center	52.5
Worcester State College	37.6
Worcester State Hospital	12.6
Worcester Secure Treatment Facility	12.6
<i>Total</i>	166.2

Source: Executive Office of Administration and Finance, Office of Redevelopment, Division of Capitol Planning and Operations

B-5. State Highway Land

Location	Acres
MHD Excess Land	38.2
Highway Taking	1.0
R.O.W Parcels	3.4
<i>Total</i>	42.6

SECTION 6 - COMMUNITY GOALS

A. Description of process

The revision of Worcester's 1994 Open Space and Recreation Plan marks the second time that recreation, conservation and open space interests have come together to develop a comprehensive plan for the City.

In 1994, this process was accomplished by involving key representatives from various interest groups into an Open Space Advisory Committee which guides the development of this plan. This committee included representatives from the following: Conservation Commission, Parks and Recreation Commission, Regional Environmental Council, Greater Worcester Land Trust, Massachusetts Audubon Society, Lake Quinsigamond Watershed Association, Indian Lake Watershed Association, Parks Spirit, the Grafton Hill Neighborhood Association and Coes/Patches Watershed Association.

This committee met several times to analyze the community's needs and set priorities. OPCD staff then summarized these concerns into a draft plan which was circulated to the committee for comments. The highlights of this plan incorporated into a second draft plan which was then discussed at separate public meetings of the Planning Board, Parks Commission, Conservation Commission and Parks and Recreation Sub-Committee of the City Council before final endorsement by the City Council. The result is a plan which integrates the needs of special interest groups and city-wide concerns.

In 1999 the City met with many of the same representatives to update factual data and current goals and objectives to meet the changing needs of Worcester and it's residents. The Committee met five times over a five month period to discuss revisions, the updated plan was then distributed to the above mentioned boards and commissions for approval.

B. Statement of Open Space and Recreation Goals

Worcester entered the 1990's with the primary goal of strengthening its role as the **regional hub of Central Massachusetts**. Several economic development projects recently completed or currently being planned for Worcester reinforce this goal, such as a new Airport Terminal, new Intermodal Transportation Center, Commuter Rail Service to and from Boston, new Convention Center, new exit from the Massachusetts Turnpike with access directly into downtown Worcester by an upgraded Route 146, Medical City, the revitalization of the downtown mall into a fashion outlet mall and the Biotechnology Park. These projects will mean change for the City through job creation, additional visitors and development pressures.

No urban area can expect to prosper in the long run unless economic growth is coupled with an ongoing effort to protect, preserve, and enhance the natural environment and the recreational facilities which make it a unique and desirable place in which to live and work. It is the goal of this plan to establish a framework of specific goals and objectives for open space and recreation which complement the City's progress in economic development.

The following Open Space and Recreation goals for Worcester reinforce the City's overall or primary goal:

1. *Acquire and improve passive and active recreation facilities and open space* to support the well being of citizens and workers.
2. Serve as a *regional center* within Central Massachusetts for sports recreational activities.
3. Protect Worcester's natural and cultural resources which give it an *identity* of its own.
4. Create, protect and preserve *greenway linkages, trail corridors, and bikeways* connecting recreational, open space, and community resources in and around Worcester.
5. *Educate the community* about the importance of our natural, historical and recreational resources and the need to protect and respect them.
6. Encourage *stricter enforcement and regular review* of land development regulations that are already in effect.
7. Strive for more *performance-based development regulations* which include encouragement of land conservation and donations of open space.
8. Target acquisition and development of *pocket parks* to enhance neighborhood identity and community-sponsored green spaces.

SECTION 7 - ANALYSIS OF NEEDS

Serving the recreational needs of people in an urbanized environment requires an understanding of the basic relationships between supply of recreational resources and their potential users. A person's perception of recreation and leisure activities varies with age, sex, cultural background and personal preferences. The availability of recreation-related facilities and services also significantly affect the variety and types of activities people will choose during their leisure time. While meeting every individual's specific preference is impractical if not impossible, public and private agencies can ensure that sufficient opportunities for recreation exist to accommodate the majority of recreational needs in the city. It is also important to insure that mechanisms exist to monitor the changing recreational needs of neighborhoods and adjust the resources to accommodate them (1982 Parks and Open Space Action Plan).

A. Summary of Resource Protection Needs

Resource protection needs have been summarized as a result of both the resource inventory as well as the inventory and mapping of protected and targeted parcels.

A-1. Statements of Need

- Continued mapping of natural resources on a Geographic Information System (GIS) (e.g. soils and development limitations, floodplains, wetlands).
- Policies which strike a balance between use of open spaces and their protection as habitats and valuable resources areas.
- Better access to water bodies for appropriate recreational uses.
- Additional linkages between passive and active recreation areas, forming greenways and potential bikeway and/or trail connections throughout the City as well as linkages to regional systems.
- Management and regulation of floodplains to protect their natural functions and to minimize flood hazards to the built environment.
- Restoration and preservation of wetlands for wildlife habitat, water supply and open space corridors.
- Policies which encourage preservation of privately-held farm, forest, open space parcels and public education.
- Management plans and maintenance resources for protected conservation parcels.
- Explore additional means for obtaining and preserving conservation and open space land besides out-right purchase. including easements, zoning or other land use and development regulations.
- Strengthen the coalition of local preservation interests to promote public/private partnerships in preservation.
- Protection of watershed from wildlife pollution (geese ducks etc.)
- Create policies which focus on the control or elimination of evasive aquatic, wetland and upland species.
- Install signage which requests boats be cleaned when transferring between water bodies to prevent the spread of bacteria and aquatic species.
- Promote the preservation of land through non-purchase methods such as neighborhood preservation.

B. Summary of Community Needs

B-1. Regional Context

- Actively promote the City as an area rich in historic resources of the 18th, 19th and 20th centuries through partnerships with groups such as Preservation Worcester and the Blackstone River Valley National Heritage Corridor Commission.
- Promote the City's rich cultural and historic heritage to attract tourism and other viable economic development activities.
- Implement air pollution reduction measures.
- Manage scenic viewsheds and tourism

B-2. SCORP-Identified Area Needs

"For Our Common Good: Open Space and Outdoor Recreation in Massachusetts" identifies the following deficiencies in recreation provision for Central Massachusetts:

- water-based recreation activities (e.g. boating, fishing and swimming),
- trail corridor programs,
- facility maintenance programs,
- preservation and conservation of water supply areas, and
- public-private partnerships for the provision of golf courses and tennis courts.

B-3. Growth and Development Patterns (Infrastructure and Long-Term Development Patterns)

- Protection of sensitive resources from development.
- Encourage development performance standards which promote open space conservation as well as design which is environmentally sensitive.
- Target areas for septic system inspection and develop a capital program to bring failing and older systems into compliance with state regulations.
- Maintain City's industrial base through creative re-use of historic structures and brownfields to reduce development pressures of open space areas.
- Consider the natural capacity of the land to support future land development and population by completing a build-out analysis for planning purposes.

C. Summary of Parks, Recreation, and Cemetery Management Needs

C-1. Facility Maintenance

Since the Open Space Plan was written, the responsibilities of the Parks and Recreation Department have continued to grow while staffing has decreased. The Department is now responsible for operating the City's cemetery - Hope Cemetery, as well as maintaining buildings formerly under the authority of the City Manager's Office.

To better meet the challenges of increased responsibilities with decreased staff, the Parks and Recreation Department developed a Maintenance Management Plan with the assistance of a grant from the National Park Service's UPARR Program. This plan recommends a maintenance staff of fifty-nine (59), a Cemetery staff of six (6), and a forestry staff of seven (7). However, staffing levels in 1999 are as follows: maintenance staff - 21 and forestry staff - 5. Furthermore, staff reductions mean the Department no longer has secretarial support to update the maintenance manual.

Fortunately, other groups have stepped forward to fill this maintenance gap. Numerous sport leagues such as Little League and soccer now maintain the fields which they use. Park Spirit, a private non-profit group, was created to solicit volunteers and funds to help maintain and improve the parks. The Friends of Hope Cemetery focus their fundraising and volunteer efforts on the maintenance and improvement of Hope Cemetery.

However, the Department still finds itself far short of the staff needed to properly maintain the facilities under its jurisdiction. Therefore, during the busy growing season, active facilities are maintained for league uses but passive facilities are maintained only on an as needed basis. Furthermore, Conservation lands have no maintenance crews. Volunteers and the City's annual Earth Day clean-up, headed by the Regional Environmental Council, are the only attention these facilities receive.

C-2. Recreation Programs

The Recreation Division of the Department has seen a continual decline of resources over the last five years. What used to be a full-time staff of four with a substantial budget is now a staff of one with no program budget. The Department now refers to itself as a "facilitator" of activities for the City. The Department still has the expertise to plan and implement a program but they need to team-up with other organizations who can provide the financial and personnel resources needed to implement successful programs throughout the City such as tournaments, parks programs, etc. An inventory of all recreational opportunities for all age groups is presently being completed by the Parks Department with the cooperation of the City Manager's Office of Employment and Training.

- Provide support staff for the Parks, Recreation and Cemetery Department.
- Develop more structured uses for neighborhood parks, especially teen programs.
- Utilize private and non-profit facilities for "after hours" recreation programs and activities.
- Pursue non-municipal funding sources to operate neighborhood-based recreational and cultural programs.
- Encourage inter-agency cooperation to stimulate program development.
- Encourage private investment in recreational areas and facilities.
- Ensure that the needs and recreational interests of residents of all social and age groups and abilities are considered to the fullest extent possible in developing recreational facility plans.
- Improve access to all types of recreation facilities.
- Relate the type and size of recreational facilities to the characteristics of the service area.
- Base acquisitions and development programs on up-to-date studies of demand and usage.
- Improve and expand opportunities for recreational swimming and beach usage by maintaining and upgrading existing facilities, by encouraging the protection of small lakes and ponds which

have traditionally accommodated swimming, and developing opportunities where feasible and appropriate.

- Seek to improve the opportunities for bicycling as an alternative transportation mode and recreational activity throughout the City.

SECTION 8 - OPEN SPACE & RECREATION

GOALS & OBJECTIVES

A. Community Goals & Objectives Planning Process

The 1999 Open Space & Recreation Plan process marks the second time that local recreation, conservation and open space interests have come together to develop a comprehensive plan for the City. This integrated process included the Open Space Advisory Committee analyzing community open space and recreation needs and setting priorities that reflect the needs of special interest groups and city-wide concerns. The result of this process is the establishment of a framework of specific goals and objectives for open space and recreation which, as noted in earlier sections of this Plan, complement the City's progress in economic development.

B. Identified Goals & Objectives

The Open Space Advisory Committee's planning process included developing a series of open space and recreation goals for Worcester in order to reinforce the City's overall goal of serving the open space and recreational needs of people in an urbanized environment. The identified goals and objectives are as follows:

I. Goal I: Open Space Areas

To establish and manage a City-wide network of publicly and privately-held open spaces intended to protect critical land water resources, habitats and scenic vistas while affording reasonable public access consistent with a policy of wise stewardship.

Objective I-1

Protection Of Unique and Sensitive Resources

To promote and achieve the protection of unique and sensitive open space and natural resources by implementing a range of both traditional and innovative protection strategies, including public efforts, support of private organizations' efforts and development of public/private partnerships.

Objective I-2

Acquisition of key parcels

To identify and acquire key open spaces through outright ownership or by less-than-fee means, such as conservation restrictions, scenic easements, and the purchase of development rights, in order to complete the City's open space network. To enlist the assistance of Federal and State open space agencies in the effort to acquire such parcels.

Objective I-3
Heightening Of Public Awareness

To develop programs and information sources (public workshops, information brochures etc.) that heighten citizen awareness of the vulnerability of remaining open space resources and of the value of protecting the open space inventory. To cooperate where possible with such public and private groups and agencies that are already promoting public awareness of open space resources.

Objective I-4
Non-Traditional Conservation Techniques

To promote the use of non-traditional conservation techniques to preserve and protect open space, including a land use regulatory system that provides incentives for protecting critical open space, as well as creating non-traditional public and private partnerships for conserving open space.

Objective I-5
Encouragement of Neighborhood Preserves

To supplement the City's inventory of publicly owned open space through the identification and protection of neighborhood preserves - these being defined as contiguous privately held tracts of land of more than five acres, in aggregate, whose preservation as open space would benefit both their specific neighborhood and the general public. To work with private landowners, and the Greater Worcester Land Trust, to secure conservation restriction on such parcels. To recommend OS-R zoning designation for such parcels.

Objective I-6
Protect Tax Fore Closure Property

To successfully transfer significant parcels of open space, that can be preserved as conservation land or utilized as community gardens, to the Worcester Conservation Commission.

Goal II: Recreation Resources

To expand the existing City-wide network of active and passive recreation properties and programs, including parks, playgrounds, playfields and basketball courts; to provide and promote innovative, efficient management of both existing and new recreation inventory and programs.

Objective II-1
Pocket Parks

To expand existing recreation resources by developing criteria for and establishing “pocket parks” to enhance neighborhoods and provide both urban recreation opportunities and green space.

Objective II-2

Recreation Maintenance Partnerships

To promote innovative recreation resource management techniques by continuing to establish neighborhood and service agency partnerships to fill the maintenance gap created by budget constraints.

Objective II-3

Comprehensive Recreation Program Inventory

To develop a comprehensive recreation program inventory that would provide a framework for efficient program utilization of recreation resources including parks, playgrounds, playfields and basketball courts.

Goal III: The Built Environment

To develop strategies, resources and objectives that promote a harmonious relationship between the existing built environment, inevitable future land development and critical natural resources, both publicly and privately-held.

Objective III-1

Public Works Projects-Resource Enhancements

To link public works projects with resource enhancement efforts; to further promote this linkage by accessing available Federal ISTEA funding designated for resource enhancement activities when planning for ISTEA-eligible public works projects.

Objective III-2

Expand the GIS System

To expand on the city-wide Geographic Information System (GIS) and incorporate GIS information including topography, size and land use coverage information when locating valuable open space and recreation resources within the City.

Objective III-3

Increase Redevelopment Efforts

To minimize disturbance of remaining open areas in the City by providing incentives to re-use and redevelop existing sites; to provide a broad range of such redevelopment incentives, including local regulatory incentives as well as securing federal/state redevelopment funding assistance opportunities.

Objective III-4
Potable Drinking Water Protection

To protect existing and potential sources of potable drinking water, by means of utilizing development incentives, permit enforcement, innovative land use techniques, and implementation of a comprehensive wellhead protection program.

Objective III-5
Historic & Archeological Resource Protection

To identify and preserve Worcester's historic and archeological sites, structures and artifacts as representations of the City's cultural heritage; to support both on-going and future efforts of both public and private organizations in promoting historic and archaeological resource protection. Prioritize protection of the last granite quarry in Green Hill Park.

Objective III-6
Street Tree Revitalization Efforts

Street trees play a major role in the beautification of the City. The Department of Public Works has been increasing their tree planting efforts. Street trees also play a major role in creating a pedestrian friendly environment which will encourage people to walk instead of driving. The City of Worcester Zoning Ordinance was amended in 1998 to include a landscaping ordinance which requires parking lots throughout the City, with nine or more space to provide interior as well as peripheral landscaping.

SECTION 9 - FIVE-YEAR ACTION PLAN

Proposals are shown Map 5-A (Conservation & Open Space Action Plan) and Map 5-B (Recreation Plan), following this page. For recreation, the Plan emphasizes the improvement of existing playgrounds and playfields. In combination with existing open area such as the Broad Meadow Brook Sanctuary, Worcester will have both active and passive recreational resources enhancing the living environment for all citizens. The open space and conservancy proposals offer

a number of techniques to protect natural and cultural resources which, once destroyed, are not easily replicated. Worcester has a number of areas worthy of this effort.

A. Recreation

1. Targeted Park Facility Master Planning

A great deal of work has been completed since the publication of this report. Two master plans have successfully been implemented for Holmes Field, which is a multi-use facility, and Apricot Street Playground. Hadwen Park master plan was completed and approximately 75% of the plan has been implemented. Logan Park and Great Brook Valley Playground master plans have also been completed and approximately 50% of these plans have been implemented.

Facility	Objectives	Potential Funding Sources	Schedule
Hadwen Park	multi-use active and passive	CDBG	High Priority
Logan Park	multi-use	CDBG	Medium Priority
Great Brook Valley Playground	play areas and multi-use	CDBG	Medium Priority
Cookson Field	multi-use	Not Identified	Medium Priority
Dodge Park	passive recreation only	Not Identified	Medium Priority
Shale Street Playground	play areas	CDBG	Medium Priority

2. Park Acquisitions

Facility	Owner	Potential Funding Sources	Schedule

Pocket Parks - In its earlier meetings, the AdHoc Open Space and Recreation Committee evaluated the need for the establishment of pocket parks within the City. Sites have not been prioritized because of the many potential vehicles for acquisition and the multiple public and private entities which may come to acquire them. Instead, a rough evaluation criteria for potential sites has been developed which includes the following: proximity to a school or other public facility, likelihood of neighborhood or business “sponsorship” (stewardship and maintenance), location at an intersection or corner lot, and likelihood of a active use, such as an urban garden. Further refinements to these recommendations will be developed.

3. Targeted Parks Improvements

Much of the targeted park improvements that were included in the 1994 Open Space and Recreation Plan have been completed, the following is a list of park improvements that have been completed or are currently under construction:

Facility	Targeted Improvements	Potential Funding Sources	Targeted for Completion
Lake Park	Master plan implementation	CDBG	FY00-01
University Park	Community building	CDBG	FY00-01
City Common	Master plan implementation	Federal/City	FY01-03
Bennet Field	Gates Lane School project	School Business Assist./City	FY01-02
South Worcester	Basketball court and parking	not identified	FY01-03
Salisbury Park-Bancroft Tower	Rehabilitation	MAHist./City	FY00-02
Morgan Park	Parking lot and drainage	neighborhood support group	Ongoing
Mulcahy Field	Rehabilitate little league field	CDBG	FY00-01
Shale Street Playground	Master Plan Implementation	CDBG	FY01-02
Green Hill Park	Soccer Field Improvements	CDBG	FY01-02
Beaver Brook Park	Basketball Courts	CDBG	FY01-03
Tacoma Street Playground	Improvements & new equipment	CDBG	FY00-02
Roberto Clemente Park (Great Brook Valley)	Vehicle controls basketball courts, soccer, football and softball fields	CDBG	FY01-03
Columbus Park	Rehabilitation	CDBG	FY00-02
Burncoat Park	Rehabilitation	CDBG	FY00-03
Fairmount park	Play equipment, courts	CDBG	FY01-03
Harrington field	Play area, courts	CDBG	FY00-02
Goddard Memorial Park	Pedestrian Improvements	CDBG	FY00-02
Banis Street	Tot Lot	CDBG	FY00-02
Holland Rink	Rehabilitation	CDBG	FY00-02

Action Plan Strategies

Recreation Facilities and Programs

Objective: Develop and maintain a comprehensive recreation program inventory.

Actions:

- In order to act more effectively as a clearinghouse for programs, to identify programming needs, to preclude program overlap and to schedule programs more efficiently, the Parks Department will conduct and monitor changes in such an inventory.
- As demand dictates, explore the development of existing City-owned facilities in addition to identifying and acquiring additional sites for recreation development.
- Increase effective utilization of existing facilities to relieve overuse and provide for present and future needs.
- Through a Recreation Capital Improvement Program, the City will schedule, in a systematic manner, the acquisition and development of recreation facilities within its financial capabilities.
- Work with the School Department to coordinate its recreation programs and properties with City-sponsored activities.

- Consider rail grade along the Middle River and elsewhere for the development of a bikepath or trail, building on the anticipated link to the Blackstone Bikeway, that can connect areas of the City and region.
- Target services and activities to special groups in the neighborhood while expanding the partnership and coalitions with neighborhood-based organizations.
- Promote youth activities through public and private schools and other service providers.
- Expand the availability of child care facilities.
- Prepare and implement cultural plans which meet the social and demographic needs of individual neighborhood populations.
- Survey area organizations and develop an inventory of existing resources.
- Collaborate with organizations currently producing annual ethnic festivals to expand city-wide audience and impact.
- Assist in the development of a multi-cultural/multi-lingual newsletter providing residents with a calendar of recreational and cultural events.
- Enlist the help of “Park Spirit” and neighborhood groups for the maintenance and upkeep of municipal public spaces.
- Use vacant lots for an “urban gardening” program.

B. Open Space

1. Conservation Parcel Master Planning

Facility	Objectives	Potential Funding Sources	Schedule
Perkins Farm (Tatnuck Brook Watershed Management Plan)	trails and open space Identification of point and non-point sources of pollution/nuisance vegetation	volunteers/Mass. Audubon Clean Lakes	completed
Broad Meadow Brook (w/ MA Audubon)	Expansion of neighborhood protection of area	Mass. Audubon	ongoing
Dawson Road	Forest Stewardship	DEM Forest Stewardship Plan	ongoing
Cider Mill	Forest Stewardship	DEM Forest Stewardship	Potential

Crow Hill	Forest Stewardship	DEM Forest Stewardship Plan	Potential
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What's Left - A Update on Worcester's Open Space

Within "What's Left: An Update on Worcester's Open Space"(1998), the City administration in conjunction with the local environmental community developed a list of targeted open space acquisitions parcels. The document summarized the relevant geographical, physical and biological data in a standardized format, created and applied a protocol for establishing acquisition priorities, summarized diverse approaches for the acquisition and/or preservation of open space and outlined planning and maintenance strategies for acquired open space. During the development of this draft, it was noted by many reviewers that the objectives of the "What's Left" document remained valid and should be referenced in this text.

In its earlier meetings, the AdHoc Open Space and Recreation Committee evaluated the list of sites "ranked" within "What's Left" and the remaining sites have been included within this Five-Year Action Plan as noted above in the extensive list of targeted parcels. The sites have not been prioritized because of the many potential vehicles for acquisition and the multiple public and private entities which may come to acquire them. Instead, a rough evaluation of "development pressure" has been made for each site by the Office of Planning and Community Development. The Greater Worcester Land Trust has been a key entity in acquiring open space included in both the What's Left and the Open Space and Recreation Plan..

Additionally, discussion regarding a nearly contiguous "emerald necklace" of parks, open spaces, and river corridors (public and private) -- some of which are already protected through various means -- to form a greenway which would encircle the City. Such a greenway would:

1. create a corridor for bicycle and/or foot paths,
2. facilitate local access to park, recreation, open space and community resources,
3. preserve migratory corridors for the City's abundant wildlife,
4. protect the water quality of associated rivers and streams, and
5. promote urban environmental education and citizen awareness and stewardship of the City's natural resources.

The assembly and preservation of greenway linkages within the City is a priority goal concurrent with, and complementary to the City's economic development goals. It is important that this document is updated at a minimum of five years to aid organizations and the City in preserving open space.

Open Space and Trail Grants

It is extremely important that the City of Worcester, in cooperation with other environmental organizations such as the Greater Worcester Land Trust, Regional Environmental Council, and the Massachusetts Audubon Society continue applying for open space and trails grants. In the past grants have greatly aided the City in acquiring open space as well as creating trail systems for hiking and biking. It is important to continue these efforts to connect open space and parks as well as promote non-motorized forms of transportation.

2. Targeted Open Space Acquisition Parcels

Facility	Use	Zoning	Development Pressure	Potential Funding Sources
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Coes Reservoir	beach/ water based rec.	RS-7	High	Army Corp. (dam)
Coal Mine Brook	Greenway linkage	RL-7		WBDC
Broad Meadow Brook (expansion)	Open space, trails	RL-7/RS-7	High	donation, bargain sale
Laurel Mountain	Trails	RS-7		Donation
Perkins Farm Expansion	Open space/trails			Donation/Grants
Northwest Greenbelt Expansion	Open space			donation, bargain sale
Overlook Road Pond	Open space	RS-7		Donation, Grants
Poor Farm Brook	Open space	RS-7		Donation, Grants
Chiltern Hill Parcels	preservation	RS-10		Donation, Grants
Stoddard Estate	Open space	RS-10		Donation, Grants
Barber Ave. Swamp	Open space	RS-7		Donation, Grants
Coal Mine Brook	Open space	RL-7		Donation, Grants
Thayer Farm	Open space			Donation, Grants
Goddard Memorial West	Open space			Donation, Grants
Passway to Scandanavia	Open space	RL-7		Donation, Grants
Coes Pond	Recreation	ML-1.0		Donation, Grants
Wildwood Ave and Kermit Road	Open space	RS-7	High	Donation, Grants
James St./Laurier St.	Open space	RS-7/MG-1		Donation, Grants
Logan Field Extension	Open space	RL-7	Extremely High	Donation, Grants
Curtis Pond and Landfill	Open space	MG-2.0		Donation, Grants
Ballard & Degman Estates		RL-7		Donation, Grants
Palace Garden Woodlot	Open space	RS-7		Donation, Grants
Catholic Charities (Parcel K)	Open/ space trails	RL-7		Donation, Grants
Guerney Property	Open space	ML-.5		Donation, Grants
Peters East	Open space	ML.5		Donation, Grants
McCabe Property	Open space	RS-7		Donation, Grants
Quist Property	Open space	RS-7	High	Donation, Grants
Eskow Woodlot	Open space	MG-.2		Donation, Grants
Ernest Ave. Marsh	Open space	RL-7		Donation, Grants
Coes Reservoir Abutters	Protection	RS-7		Donation, Grants
Kettle Brook	Open space	RS-7		Donation, Grants
Poor Farm Brook	Open space	RS-7		Donation

Action Plan Strategies

Open Space and Scenic Areas

Objective: Use of non-traditional conservation techniques and partnerships.

Actions:

- Support and encourage the efforts of the Greater Worcester Land Trust, Mass. Audubon Society, The Nature Conservancy, The Trustees of Reservations, Trust for Public Lands, and other non-government non-profit land holding agencies.
- Pursue and support State Open Space bond issues.
- Consider tax incentives/abateements for owners of significant open space.
- Target proceeds from the sale of municipal tax title properties and municipal holdings to an open space acquisition fund.
- Transfer selected tax title properties to the Conservation Commission for preservation.
- Pursue the acquisition and/or transfer of vacant tax exempt property.
- Make maximum use of waterbodies for recreation and other purposes wherever possible in a manner consistent with the characteristics and uses of the waterbodies themselves and with the standards governing water suppliers.
- Through acquisition of rights-of-way to water bodies and through other conservation programs (e.g. greenway programs), conserve and preserve natural open spaces.
- Make acquisition of sites on or providing access to water bodies a priority in future acquisition programs.

Objective: Protection of unique and sensitive resources.

Actions:

- Ensure that open space is retained as a resource for passive recreation opportunities, while also providing protection for the physical and natural environment.
- Preserve the city's natural resources by working to save the best representatives of the ecosystem types found in Central Mass., and protecting rare and endangered species and unique geologic or other natural features.
- Work toward prevention or mitigation of adverse impacts of human activities on wildlife habitat.
- Maintain wetlands in their current state to the extent possible as critical elements of groundwater recharge, wildlife habitat, flood storage, and for their environmental value.
- Endeavor to create open space systems and corridors which protect complete ecological units, provide structure and character to the built environment and provide recreation and open space opportunities close to developed areas.
- Protect wetland areas through acquisition of lands which protect their biological and hydrological integrity, provide opportunities for public access and usage, and enhance the proper management of wetland systems.

- Retain open spaces large enough to serve as wildlife habitat, store flood waters, abate air pollution, provide a sense of “openness” and serve as buffers and aesthetic amenities to existing development.
- Continue efforts to preserve the City’s best remaining farmland for active agricultural use.

Built Environment

- Amend the Zoning Ordinance and Subdivision Regulations to encourage unobtrusive development on hilltops and ridges, that roads follow the natural contours of the site, and that the natural assets of the site are preserved.
- Promote revisions of the state subdivision control law (Chapter 41).
- The Planning Board should continue to require an advisory opinion from the Conservation Commission on potential impacts of development proposals to on- and off-site wetlands, including impacts to flood control, groundwater, surface water quality, wildlife habitat and recreation.
- Encourage in-fill housing, with emphasis on privately held parcels.
- Conduct an ongoing study of design alternatives and best management practices for stormwater runoff controls.
- Study the merits of establishing a municipal septic system inspection program.
- Amend the Zoning Ordinance and Subdivision Regulations to encourage that buildings, signs and parking areas should not block vistas from roads and other public areas.
- Encourage development mitigation measures which reduce air pollution levels.
- Work with the regional transit authority and local businesses to implement air pollution reduction measures including, but not limited to: commuter services, park and ride lots, bus transit, carpool/van programs, variable work hours, etc.
- Develop an adaptive reuse program for mill structures.
- Encourage the schools to expand educational efforts and resources committed to teaching about local history such as promoting volunteer participation and other efforts.
- Expand the City’s streetscape program through the Main Street Corridor.
- Improve the existing bus stops through better signage, lighting and street furniture.
- Upgrade and maintain the natural and built environment along neighborhood street, targeting “pockets of opportunity”.
- Expand municipal and “grass roots” clean-up and rubbish removal activities.
- Pursue violators who dump illegally, targeting vacant lots.
- Promote and expand the Worcester Parks Department tree maintenance and planting program for street trees.
- Accentuate historic properties and ensure their protection through local and neighborhood historic district designation.
- Continue to fund infrastructure improvements with available state and federal funds.
- Pursue state highway funds to develop Transportation Systems Management (TSM) improvements along the Main Street corridor aimed at reducing congestion and increasing traffic flow.

SECTION 11

HIKING AND BIKING TRAILS

The City of Worcester has made a great deal of progress in promoting hiking and biking trails. A four phase on road bicycle path has been planned throughout the City utilizing ISTEA funds. The bike system includes bicycle signs marking the routes as well as kiosks being planned and placed at key locations. Bicycle racks and benches have been placed at resting areas, open space and recreation locations. Through this ISTEA program the City has applied for funding to place bicycle racks on City buses, the WRTA is in the process of creating an instructional brochure on the use of these bicycle racks.

Phase I is on the ground and Phase II is currently in the process of being implemented. These trail systems have been planned to provide pedestrian friendly environments and promote non-motorized forms of transportation. Another primary goal when planning the bicycle trail system was to create on road connections to the many protected open space parcels located throughout the City. A biking and hiking brochure was recently completed through a DEM Greenways and Trails Grant. This Map was oriented for pedestrian use and marks protected open space parcels and both proposed and existing biking trails. On the reverse side of the brochure is a detailed map of existing hiking trails for Cascades Park, Hadwen Park, Perkins Farm, Parsons Cider Mill, and the Broad Meadow Brook Wildlife Sanctuary. A copy of this map is attached to the back cover.

ISTEA Bike Trail System

Phase I – Is existing and provides a north/south connection on the westerly side of the City. The trail originates at the Leicester Town line on Bailey Street abutting the City of Worcester International Airport. The trail proceeds east and branches north on Olean Street connecting to Cook Pond and Cascades Park. The trail proceeds south and accesses recreational and hiking opportunities at Logan Field where bicycle racks and a kiosk sign are provided. The bike route then proceeds southerly on Mill Street connecting to Patches Reservoir and the abutting conservation commission parcels. The City has received funding and is currently in the process of implementing a hiking trail system on the southern conservation parcel of Patches Reservoir. Phase I provides access to Coes Beach, the proposed Coes Knife Park, Hadwen Park, and Hope Cemetery were it proceeds north on Southbridge Street to McKeon Road, accessing Holy Cross College were bicycle racks and benches have been installed. McKeon Road will provide access to Middle River Park were a proposed hiking trail is planned connecting to the Blackstone Canal Visitor's Center. This biking trail terminates at the southerly end of McKeon Road were a connection to the Route 146 bicycle trail is provided. A smaller branch of Phase I has also been installed which originates at Washington Square and proceeds north providing a connection to Salisbury Pond and Indian Lake.

Phase II – is currently being implemented. This trail system will connect to the terminus of the Route 146 bicycle trail at the northern intersection of Millbury Street and Ballard Street. This trail system will proceed along Quinsagamon Avenue providing access to Crompton Park. The trail will then proceed through the Green Island neighborhood and connect to the newly renovated Union Train Station. A separate branch of Phase II will run along south Main Street providing

hiking access at Cider Mill Park and recreational opportunities at Apricot Street Playground. This trail will serve as a connector to the Town of Leicester.

Phase III – Has been planned and awarded funding but the funding has not yet been received. Phase III has a variety of branches. There is currently an East West connection from Union Station to Lake Park north up Lake Avenue to Regatta Point State Park. Another branch of the trail will provide a connection between Union Station, Cristoforo Columbo Park and Green Hill Park connecting to Lincoln Street. The third branch will be a continuation of Phase I north on Holden Street running parallel to Indian Lake and providing access to the Town of Holden. A branch of this trail runs east on Shore Drive providing access to Shore Park.

Phase IV – Has been planned and awarded funding but the funding has not yet been received. Phase IV includes the installation of 13 kiosk signs at various locations and 125 hiking trail signs on an east side Logan Field trail program. This Phase will also include sidewalk improvements on Mill Street, Airport Drive and Grove Street as well as the installation of street trees along Airport Drive. Bicycle lockers will be installed at Union Station as part of this program.

Phase V – Round of applications was for 1999 was delayed. The City's preliminary plans are to enhance east west connections in the City as well as create intercollegiate bicycle routes.

Route 146 Bicycle Route - Is being planned and implemented through the cooperation of DEM, Mass Highway, The Blackstone Valley National Heritage Corridor and the City of Worcester in conjunction with the construction of Route 146. This bike route will provide immediate access to the Town of Millbury and proceed southerly into Rhode Island. Within the City of Worcester the bike route is proposed to run off road along the Blackstone Canal connecting to the proposed Visitors Center and DEM parkland located off of Millbury Street where it will connect to existing Phase I and planned Phase II bicycle routes.

DEM – State Greenways and Trails Program

DEM has initiated a statewide greenways and trails program with the purpose of promoting and planning statewide hiking and biking trail connections. Representatives from various communities gathered for several meetings to inventory and map existing trail systems throughout regions of the state. After existing trails were mapped and accurate, communities gathered to plan feasible connections. The City of Worcester has been participating in this initiative and has planned on road bicycle connections to the Towns of Grafton, Leicester, Holden, Shrewsbury and Millbury. On a larger scale the trail system will connect to the Watchussett Reservoir and the Central Rail Trail. Many of these trail systems are in place on unprotected land. Permanent protection of this land will be a primary goal of improving the interconnecting trail system.

SECTION 12 - REFERENCES

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- What's Left: An Update on Worcester's Open Space (City of Worcester, 1998).
- Worcester Component: Blackstone River and Canal Heritage State Park Program Objective Report (Massachusetts Department of Environmental Management, 1987).
- Worcester Master Plan (Worcester Planning Board, 1987).

APPENDIX A

<p>Targeted Open Space Acquisition Parcels</p>

APPENDIX B

Open Space & Recreation Plan Maps

Appendix B Map Inventory

***Map 1* - Zoning Map (located in back cover pocket)**

***Map 2* - Worcester Watersheds & Aquifers**

***Map 3* - Water Resources Map**

***Map 4* - Open Space Map**

***Map 5A*- Conservation & Open Space Action Plan**

***Map 5B*- Recreation Plan**

***Map 6* -**